Marco Paulo Vianna Franco

# Essays on the History and Philosophy of Ecological Economic Thought

Belo Horizonte, MG
UFMG/Cedeplar
2019

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Tese apresentada ao curso de Doutorado em Economia do Centro de Desenvolvimento e Planejamento Regional da Faculdade de Ciências Econômicas da Universidade Federal de Minas Gerais, como requisito parcial à obtenção do Título de Doutor em Economia.

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Belo Horizonte, MG
Centro de Desenvolvimento e Planejamento Regional
Faculdade de Ciências Econômicas - UFMG
2019

Ficha catalográfica

F825e 2019

Franco, Marco Paulo Vianna.
Essays on the History and Philosophy of Ecological Economic Thought [manuscrito] / Marco Paulo Vianna Franco. – 2019.
162 f.

Orientador: Hugo E. A. da Gama Cerqueira.
Coorientador: João Antônio de Paula.
Tese (doutorado) – Universidade Federal de Minas Gerais, Centro de Desenvolvimento e Planejamento Regional.
Inclui bibliografia (f. 147-162).

1. Economia – História – Teses. 2. Economia – Teses. 3. Desenvolvimento sustentável – Teses. I. Cerqueira, Hugo E.A. da Gama. II. Paula , João Antônio de. III. Universidade Federal de Minas Gerais. Centro de Desenvolvimento e Planejamento Regional. IV. Título.

CDD: 330.09

Elaborada pela Biblioteca da FACE/UFMG. –RSS54/2019

# Folha de Aprovação

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*To Helena, Rachel, and Evando. Future, present, and past that inspire visions of joy and freedom for all beings.*

## ACKNOWLEDGEMENTS

The present work is one of the outcomes of a deeper transformation at the personal and professional levels, which was only possible with the aid of several individuals. As new values, beliefs, and convictions surfaced, a new career seemed inevitable. The extent of this transition has not always been overtly disclosed, and, thus, many people still do not realize the importance of their contributions to this endeavor. It has been said that those that love what they do, will never have to work for a single day in their entire lives. For some time now, I feel free from the shackles of involuntary labor. Therefore, recognition is due to those who, selflessly and sometimes unknowingly, were a part of this venture. Your kindness is sincerely and wholeheartedly appreciated.

I am most grateful to my advisors, Profs. Hugo da Gama Cerqueira and João Antônio de Paula, for sharing with me their time and expertise, and above all for supporting my decision to pursue my dearest research interests. You have taught me what intellectual freedom is. It has been a pleasure to work with you.

I would also like to thank the faculty of the Center for Development and Regional Planning of the Federal University of Minas Gerais (Cedeplar/UFMG), especially Profs. Roberto Monte-Mór, Carlos Eduardo Suprinyak, Leonardo de Deus, Eduardo Albuquerque, Alexandre Cunha, Édson Domingues, and Mônica Viegas. Thanks also to my fellow students at Cedeplar/UFMG for their *esprit de corps*, in particular Ian Coelho Almeida, Thiago Dumont Oliveira, and Jakob Sparn, for very fruitful exchanges of ideas.

I express my sincere gratitude to the João Pinheiro Foundation for its institutional support to my academic training, without which this work would not be possible. A special thanks to Prof. Raimundo Leal Filho, who has helped me in so many ways, and to the colleagues and friends with whom I have shared so much in the last four years.

I am also grateful to the members of the Brazilian Society for Ecological Economics, who have warmly welcomed me as one of their peers.

I am profoundly appreciative of my time at the Institute for Multilevel Governance and Development of the Vienna University of Economics and Business. I would like to thank Prof. Andreas Novy, the Head of the Institute, for having me over, and Ursula Grafeneder, for her kind assistance. I am particularly grateful to Prof. Clive Spash for accepting me as one of his students; for teaching me so much on critical realism, social ecological economics, and academic writing; and for all the time we spent together, the meetings, pizzas, and dinners, when I had the luck to get to know the most inspiring people, such as Tone Smith-Spash, Armin Puller, and Wolfgang Fellner. I thank the Brazilian Federal Agency for Support and Evaluation of Graduate Education (CAPES) for funding my stay in Austria.

A special thanks to Prof. Antoine Missemer and the *Centre International de Recherche sur l'Environnement et le Développement* (CIRED, CNRS) for having me as a guest in October 2017, and for our close collaboration and friendship ever since. I am also grateful to other members of the Bifurcations in Natural Resource Economics (1920s–1930s) (BNRE) Project, Marion Gaspard, Thomas Mueller, Roberto Ferreira da Cunha, and Franck Nadaud, for our joint work and cooperation.

Many other scholars have offered me guidance or helped in a particular way. I would like to thank Profs. Arran Gare, Breynner de Oliveira, Daniel Campolina, François Allisson, Denis Melnik, Douglas Weiner, Mikhail Miriakov, and Pedro Garcia Duarte.

This work would not have been possible without the online content made available by the project "Electronic Scientific Publications of N. G. Chernyshevskii", supported by the Russian Foundation for Humanities, and the electronic libraries of the State Public Historical Library of Russia, of the Maksim Moshkov Library, and of the Russian National Library. Such initiatives are truly appreciated.

I have no words to convey how thankful I am to my family. The education I have received from my parents, Cibele and Paulo, is the ultimate reason why I am able to choose my own path. Thanks to the whole Vianna, Franco and Myrrha families. I am particularly grateful to Marise for all her kind support and not least to Evando, who will be with me in memory forevermore.

Finally, I would like to thank Rachel and Helena for their unabated understanding, patience, and affection at times I seemed distant. Even more, I thank them for showing me that a bright future is only worthwhile if we get to share it with our loved ones.

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# RESUMO

O presente trabalho visa contribuir para a história e filosofia do pensamento econômico-ecológico (PEE), com foco no pensamento russo e no conceito de utopismo ecológico. O primeiro ensaio traz um relato histórico do PEE no período entre 1880 e 1930, fundamentando-o na energética social e demonstrando sua diversidade intelectual. Foi identificado um metaparadigma científico que combina diferentes valores, métodos e ideias em uma crítica ecológica à economia convencional, consistindo em uma abordagem biofísica aos processos econômicos. Com base nesse relato, o segundo ensaio trata da produção científica dos ecólogos soviéticos da década de 1920, cuja junção entre ecologia das comunidades, conservação e planejamento econômico se revelou inovadora e adequada à sua caracterização como utopismo ecológico. O terceiro ensaio reconhece o movimento narodnista do século XIX não apenas como uma das origens intelectuais da ecologia soviética, mas como uma importante escola do PEE em si mesma. O utopismo ecológico de Nikolai Chernyshevskii é apresentado como uma combinação do embasamento de suas ideias nas ciências naturais e de sua visão acerca de ideais sociais igualitários, que serviriam de inspiração para o movimento revolucionário narodnista. O quarto ensaio analisa a ideologia do neo-narodnismo ecológico como alternativa viável ao enfrentamento de desafios sociais e ambientais próprios do século XXI. Argumenta-se que, enquanto economia política, o neo-narodnismo ecológico deveria ir além da economia chaianoviana, resgatando princípios caros a Chernyshevskii, como a comunalidade e a cooperação. Enquanto ecologia política, o mesmo é reconhecido como herdeiro do legado narodnista; é bem representado pelos movimentos pela justiça ambiental; combina aspectos étnicos e locais dos movimentos camponeses com sua tendência de internacionalização; considera relações de poder como questão central para a defesa dos direitos dos camponeses; e incorpora limites biofísicos em nível planetário como um novo argumento em favor de uma mudança sistêmica.

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**Palavras-chave:** economia ecológica; história do pensamento econômico-ecológico; narodnismo; neo-narodnismo ecológico; ecologia soviética.

# ABSTRACT

This work aims to contribute to the history and philosophy of ecological economic thought (EET), with a focus on Russian thought and the concept of ecological utopianism. The first essay brings a historical account of EET in the 1880s-1930s, showcasing its intellectual diversity and foundation on social energetics. A scientific metaparadigm was identified, combining different values, methods and ideas into an ecological critique of mainstream economics, comprised of a biophysical approach to economic processes. Bearing in mind such developments, the second essay addresses the body of knowledge produced by Soviet ecology in the 1920s. Research on the links between community ecology, conservation and economic planning revealed how innovative their views were and how well they fit into the definition of ecological utopianism. The third essay acknowledges 19$^{th}$-century narodnism not only as one of the intellectual origins of Soviet ecology, but as an important school of EET on its own. The ecological utopianism of Nikolai Chernyshevskii is explained in terms of the extent his ideas were grounded in the natural sciences, and how he envisioned egalitarian social ideals, which would serve as inspiration for the narodnist revolutionary movement. The fourth essay analyzes the ideology of ecological neo-narodnism as a viable alternative to deal with the social and ecological challenges of the 21$^{st}$ century. It is argued that, as political economy, it should move beyond Chaianovian economics to redeem the principles of communality and cooperation of Chernyshevskii. As political ecology, it is a true heir of narodnism; it is best represented by environmental justice movements; it combines the ethnical and local character of peasants' movements with the need for internationalization; it addresses power relations as a key issue to enforce peasant's rights; and it adds biophysical limits at the planetary level as a new argument in favor of systemic change.

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**Keywords:** ecological economics; history of ecological economic thought; narodnism; ecological neo-narodnism; Soviet ecology.

# 1 INTRODUCTION

> "'What we've shown you will not soon reach its full development in the form you've just seen. Many generations will pass before everything you can now foresee is to be fully realized. No, not many generations. My work is progressing quickly, faster with each passing year. Nevertheless, you still won't enter into my sister's completed kingdom. But at least you've glimpsed it, and now you know what the future will be. It's radiant and beautiful. Tell everyone that the future will be radiant and beautiful. Love it, strive toward it, work for it, bring it nearer, transfer into the present as much as you can from it. To the extent that you succeed in doing so, your life will be bright and good, rich in joy and pleasure. Strive toward it, work for it, bring it nearer, transfer into the present as much as you can from it.'
> – Nikolai Chernyshevskii, *What is to Be Done*?"

This work is composed of four main essays on the history and philosophy of ecological economic thought. As will be more thoroughly defined in Chapter 2, ecological economic thought refers to the interlinkages between economics and ecology, describing the former by means of the analysis of the flows and stocks of energy and matter, including their implications for the processes of social provisioning and cultural development. The literature on the history of ecological economic thought is still far from satisfactorily covering the most important historical developments of this subject area. Martinez-Alier (1987) probably stands alone as an attempt to comprehensively address this intellectual thread.

Utopian thought occupies a significant share of the contents of this history of ideas. As the limited character of flows of energy and matter is acknowledged, some form of idealized social organization would need to be conceived and implemented so that all members of society could have their basic needs fulfilled. Another important element is the geographical dimension: while Martinez-Alier focuses on Western ecological economic thought, thinkers from other regions have hitherto been neglected. In this sense, the history of Russian ecological economic thought constitutes an interesting research topic, as their contributions to the field have been not only relevant, but somewhat continuous over time. The

Russian intelligentsia (maybe the term “Slavic” would be a better choice, since there were also important figures from Ukraine and other Slavic countries. However, the main authors discussed here lived and worked in Russia) displayed what will be throughout this work referred to as ecological utopianism.

Each one of the four essays is intended to make a particular contribution. Thus, they can be regarded as stand-alone essays grouped to form a more thorough analysis of Russian ecological utopianism. Conversely, there is a logical concatenation that bonds all the essays, and, hence, reading the third or fourth essays without reading the previous ones would inevitably lead to some level of confusion. The essays were planned to be more self-contained than they actually are; in any case, a stronger bond between them carries the advantage of a greater level of cohesion.

The first essay (Chapter 2) brings a more general outlook on the history of ecological economic thought in the period between the 1880s and 1930s. It serves as an introduction for the following essays, and shows how unexplored this subject still is. In addition, it entails a particular contribution, arguing that a Kuhnian metaparadigm prevailed in the given period, and how a full-blown paradigm is currently needed among ecological economists.

The second essay addresses early Soviet ecology as one of the initiatives within ecological economic thought that deserves a closer historical analysis. The attempts of Soviet ecologists to combine conservation with economic planning were amongst the most advanced of their time. Despite the fact that many of these thinkers turned to the West for inspiration, the weight of traditional Russian culture and science cannot be overlooked. Thus, the third essay delves into 19$^{th}$-century narodnism in search for elements that could help explain the development of Russian ecological utopianism. Research into the thought of one of the narodnik intellectual leaders, Nikolay Chernyshevskii, aims to corroborate the hypothesis that narodnism was, in fact, one of the most important schools of ecological economic thought, and that their intellectual legacy outlived the abandonment of their more immediate revolutionary demands.

The fourth and last essay brings the discussion to the 21st century, analyzing what an ecological neo-narodnism entails, and how it could be an alternative for the current social and environmental challenges imposed, respectively, by rising social inequality and degradation of the biophysical systems that keep humankind alive.

In short, the aim of the present work is two-fold: to unearth historical knowledge for its own sake, and to promote ecological economic thought, especially its utopian current, as an intellectual movement whose worldview might be instrumental to ongoing debates on how to set up a fair and sustainable society.

# 2 THE HISTORY OF ECOLOGICAL ECONOMIC THOUGHT, 1880S-1930S

The history of ecological economic thought (EET) concerns the historical development of the interlinkages between economics and ecology, described through the analysis of the flows and stocks of energy and matter and their economic implications for the processes of social provisioning and cultural development. Energy in the form of solar radiation is absorbed and fixed by plants, hence, the role of agriculture in human ecology studies, including energy accounting, gradually climbing the trophic ladder all the way up to humans and other animals, providing subsistence to all. On the other hand, the flows and transformations of renewable and exhaustible materials (which also encompass embodied energy, e.g. fuels) are analyzed regarding their scarcity and potential for satisfying human needs. Thus, a strong sense of embeddedness of the economic system in the biophysical universe is present throughout the history of EET, with the immediate consequence that all economic reasoning must be solidly anchored in the natural sciences.

A biophysical approach to economic science serves as a common thread in the history of EET, representing the views of otherwise very dissimilar thinkers. This assumption also makes the history of EET quite distinct[1] and different from the more profuse literature on the history of environmental economic thought, in which appear works such as Kula (1998), Pearce (2002), Sandmo (2015) and Brown et al. (2016). The latter focuses on the history of ideas regarding environmental restrictions and boundaries to the economic process, analyzing phenomena in a cause-effect relationship with market prices and in terms of market failures, efficient allocation, and a demand-oriented concept of marginal utility. This approach, as observed by Martinez-Alier (1987), is related to the Aristotelian

[1] The literature on the history of EET is still relatively scarce, especially the more comprehensive accounts such as Martinez-Alier's (1987), which provides a historical outline upon which this chapter has drawn many insights.

meaning of chrematistics – the art of exchange through the use of money, with prices as market entities without a direct link to physical goods – in stark contrast with a more materialistic view of economic processes as flows and stocks of energy and matter, subject to entropic laws and sources of livelihood. Thus, energy accounting of human societies and studies regarding the scarcity of natural resources for concrete production processes can be treated as a distinct history of ideas, acting as the main line of investigation to refer to the history of EET. As put by Christensen (1989), one could then split the history of economic thought, when in connection with environmental issues, into biophysical and allocative approaches[2]. Only the biophysical approach will be addressed here.

Moving beyond the dichotomy presented by the biophysical and allocative approaches, other frameworks might also be considered to address environmental questions in the history of economic thought, such as the evolutionary approach of American classical institutionalists. They focused on the evolutionary character of natural and social processes, the dynamic role of institutions and the disconnection between monetary systems and the actual technical requirements of production, and influenced prominent ecological economists working in the mid-20th century, including Nicholas Georgescu-Roegen (1906-1994), Kenneth E. Boulding (1910-1993) and K. William Kapp (1910-1976). A historical account of an evolutionary approach to EET would be quite different from the one offered in this chapter. Focus would be shifted from the analysis of the flows of energy and matter in the economy to the evolutionary character of economic processes. Nevertheless, the definition of EET given above relates to the biophysical approach, which does not preclude the observation that evolutionary processes are an important topic of such a framework, either in terms of human organization and behavior or Darwinian natural selection.

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[2] Despite the characterization of social sciences (and the allocative approach of neoclassical economics in particular) as suffering from “physics envy” (Mirowski, 1989), as they try to emulate the determinism and mathematical formalism of the hard sciences, it seems that modern thermodynamics has not enjoyed the same treatment as analytical mechanics (Christensen, 1987). To Martinez-Alier (1987), by the end of the 19th century, the emerging neoclassical economics was at the same time becoming closer to a formal physical analysis and farther away from an ecological physical analysis.

In addition to the biophysical approach to economic processes presented above, another key aspect of EET concerns its implications for both descriptive and normative assessments of social systems. The reality of the natural world, subject to the entropy law, has direct effects over human organizations and their provisioning processes, including the issue of the short- and long-term ideals of society (thus comprising the intergenerational dimension) and the policies which would lead to such ideals. These effects are of great relevance to EET, among them nature as a source of value, moral aspects regarding natural resource distribution, evolutionary and technological transformations, and how biophysical endowments and restrictions act upon the development of specific cultures. These questions, as will be shown below, have been addressed by means of a quite diverse assortment of worldviews, ideologies and theories.

Over the last thirty years, the links between ecology and economics have been the main object of study of ecological economics, a discipline[3] which focuses on the human economy both as a social system and as subject to a biophysical reality. Core values such as the criticality of environmental problems, the embeddedness of the economy in nature and the awareness of the complexity of social and natural phenomena have led to the attempt to bring together social and natural sciences in an effort to better understand the relationship between human society and nature (Røpke, 2005). Economic processes either are or effectuate natural processes, comprised ultimately of biological, physical and chemical transformations. General systems theory and the laws of thermodynamics can therefore provide crucial insights into the study of ecology and economics through the observance of biophysical constraints on a finite planet and the role of flows and stocks of energy and matter in the life-supporting metabolic processes on Earth (Boulding, 1966; Daly, 1968; Georgescu-Roegen, 1971).

[3] Ecological economics is characterized throughout the text as a “discipline” or “school” without a more rigorous methodological analysis. A thorough evaluation of ecological economics as a discipline, field, movement, and school of thought remains a worthwhile endeavor for future philosophical studies on ecological economics.

Such formulation corresponds to a modern ecological view of economic processes, developed and strengthened from the 1960s up to the 1980s, a period which has been referred to as the "early history of modern ecological economics" (Røpke, 2004, p.294), and that culminated with the institutionalization of the International Society for Ecological Economics (ISEE) in 1988. Nevertheless, the history of ideas concerning the interconnections between ecology and economics stretches back at least as far as the second half of the 19th century, when social energetics[4] and natural resource (fertile lands, materials, fuels, etc.) scarcity studies were systematically produced[5]. An analysis of the development of ecological economic ideas further back in time, explored between the 1880s and the 1930s, could contribute to a better understanding of the early history of modern ecological economics, as well as to the current position of the discipline in relation to its values, goals, methods and contents. The relevance of a historical account focused on the diversity of EET is increased by its potential to inform or provide a historical perspective on the ongoing debate among ecological economists on the benefits and limits of the adoption of a broad methodological pluralism (Baumgärtner et al., 2008; Costanza, 1989; Gowdy & Erickson, 2009; Lo, 2014; Norgaard, 1989; Özkaynak et al., 2012; Røpke, 2005; Söderbaum, 1999; Spash, 2012; Tacconi, 1998). This is defined by Norgaard (1989, p.51) as a methodological stance in which participants would act as: "(1) being conscious of their own methodologies; (2) being conscious of the advantages and disadvantages of the methodologies used by others; and (3) being tolerant of the use of different methodologies used by others".

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[4] The term energetics was coined by William Rankine (1820-1872) in 1855 with the same meaning as the later widespread concept of thermodynamics. Thus, social energetics refers to thermodynamic principles as applied to a social system, i.e. the flows and stocks of energy that shape and condition the functioning of human societies. However, the laws governing the many different forms in which energy is transformed or exchanged – the laws of energetics – are broader in scope than the laws of thermodynamics. In addition, studies using social energetics might adopt different assumptions regarding the dynamics of energy transformations, as well as different methodologies in their attempt to better understand such dynamics. This chapter omits these particularities and refers to these studies as a group.

[5] A non-exhaustive compilation of such studies can be found in Martinez-Alier (1986).

The debate on methodological pluralism has been accompanied by attempts to assess whether the discipline of ecological economics entails or should entail a scientific paradigm, with diverging conclusions (Anderson & M'Gonigle, 2012; Illge & Schwarze, 2009; Klaassen & Opschoor, 1991; Söderbaum, 2015; Turner et al., 1997). The acceptance of disparate views on the relations between ecology and economics within the scope of the discipline was initially seen as the best alternative to deal with impending global environmental issues such as climate change, biodiversity loss, chemical pollution, atmospheric aerosol loading, ocean acidification, and others (Costanza, 1989; Norgaard, 1989). However, more recent works (Lo, 2014; Spash, 2012) questioned such an approach, arguing that ecological economics has paid a price for its broad pluralism, as it lacks internal coherence and scientific relevance. The acceptance of neoclassical economic thought as part of EET (and, therefore, not only as part of the allocative approach of environmental economic thought) is particularly contentious. Many ecological economists have posed the question of what would be a research programme for ecological economics that could ensure it is both relevant and influential on the decision-making process (Baumgärtner et al., 2008; Özkaynak et al., 2012; Spash, 2012; Tacconi, 1998), which can be interpreted as a search for a scientific paradigm.

Efforts to identify a scientific paradigm in EET for periods preceding Røpke's early history of modern ecological economics are lacking in the literature. A scientific paradigm is here understood, in a Kuhnian sense, as "made up of the general theoretical assumptions and laws and the techniques for their application that the members of a particular scientific community adopt" (Chalmers, 1999, p.108). Martinez-Alier (1987), probably the most thorough reference on the history of EET in a single volume, does not address the question of the formation of a scientific paradigm or provide a more systematic framework of the diversity of EET throughout history. The biophysical approach to economic processes acts as a foundation in his historical account, and the diversity of thought is gradually presented as the author moves along intellectuals from the late 19$^{th}$ to mid-20$^{th}$ centuries. However, it is not possible to infer from his book whether a scientific paradigm has actually been formed and, if so, in what sense. This is what will be pursued here.

According to Martinez-Alier (1987), one could objectively state that there has been a school of ecological economics since the 1880s. Prior to this decade, publications on the subjects of natural resource scarcity or social energetics were occasional. Jevons (1865) might be an important exception to this claim. His analyses (before his turn to marginalist theory and equilibrium) included the nonrenewable character of coal and the intergenerational implications of resource exhaustibility, the observation that the energy stored in coal placed an upper limit on industrial activity and, therefore, to future prosperity, and the seemingly paradoxical positive correlation between the thermodynamic efficiency of machines and coal consumption – the rebound effect (Missemer, 2012). Other than that, the 1880s saw the beginning of recurrent publications and systematic accumulation of knowledge in relation to energy and matter flows in economic processes, as in the case of the works of Sergei Andreevich Podolinskii[6] (1850-1891), Eduard Sacher (1834-1903), Patrick Geddes (1854-1932) and Rudolph Clausius (1822-1888). The laws of thermodynamics had already been established a few decades earlier, offering a key theoretical foundation for these initiatives. Although most economists of the time were not interested in the subject, which was then partly left for natural scientists to develop, the period was very productive for the advancement of an approach to economics based on physical elements (energy and materials). These reasons substantiate the choice of the 1880s as a starting point of the analysis[7].

On the other hand, the 1930s were followed by a relative pause in efforts associated with EET that would only be resumed in the 1960s (with important exceptions, such as White [1943] and Cottrell [1955]). A strong interest among economists in problems related to the lack of aggregate demand in the short-term (especially after the 1929 crash) and the acceptance by neoclassical economists

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[6] This text uses the ICAO Sytem (Doc 9303 "Machine Readable Travel Documents, Part 3", 2008) for the purposes of transliteration from the Russian language.

[7] Christensen (1987) and Cleveland (1987) have contended that classical economists and the physiocrats could be regarded as part of the history of EET. Without going into the merit of the question, the focus here lies, instead, in the developments seen in EET after the appearance of modern thermodynamics in the middle of the 19th century.

that there were indeed some natural resources that were irreversibly exhaustible (Hotelling, 1931) have been suggested as possible causes for the slower pace seen in the progress of EET in the 1940s and 1950s (Martinez-Alier, 1987). At any rate, the EET of the 1960s and the following two decades would present a different set of characteristics in terms of content and context, although it preserved the described biophysical approach. Systems ecology, the “processes at work in the wider society and diffuse social influences” and the “breakdown of borders between scientific disciplines” (Røpke, 2004, p.297) would be part of a preamble to the subsequent formalization of ecological economics as a standalone scientific discipline.

The following section contains a reconstruction of the history of EET from the 1880s to the 1930s, emphasizing its foundation on the biophysical approach and the different beliefs about the intertwining of the natural and social realms. The diversity of thought observed in the period is assessed in terms of the ways in which theories, ideologies (as systems of ideas and ideals) and worldviews persistently diverged and by how this diversity of thought contrasted to what actually brought these thinkers together. The findings are then used in section 2.2 to explain the formation of a scientific metaparadigm within EET during the period under scrutiny. I argue that this body of ideas falls short of reaching a scientific paradigm. Section 2.3 draws some insights concerning paradigm formation in modern ecological economics and how it is related to the ongoing debate among ecological economists on the benefits and limits of the adoption of a broad methodological pluralism.

## 2.1 The diversity within EET

Having the biophysical approach or social energetics as a foundation, concepts that share the same meaning in this context, the diversity within EET comes from the particular views on its impacts over social provisioning processes and, in turn, the arising moral and policy issues conducive to a determined social goal (including if there should be one at all). In this perspective, opinions have largely differed. Two main subjects or areas of dissent can then be identified within the EET of the 1880s to 1930s: (i) the extent to which energy can be considered a

determinant of cultural development; and (ii) the normative aspects involving resource distribution, social ideals and policy-making.

### 2.1.1 Energy as a determinant of cultural development

The influence of biophysical endowments and restrictions on cultural development entails a diverse assortment of ideas in the history of EET. Energy availability and use, subject to entropic constraints, would determine how human organizations are formed, provided for and transformed through time, hence conditioning processes of cultural development. Such a view relates to the foundational aspect of the biophysical approach of EET and how it was shared by thinkers deemed part of the same history of ideas. However, the extent to which there is a direct link or determinacy between energy availability and use and cultural development varied sharply between these same thinkers. A radically reductionist stance would imply that cultural development is exclusively determined by the use of available energy by social groups, resulting in an energy theory of value. Its opponents, on the other hand, would see emergent properties in social systems that mean that cultural development is the result of a multi-layered process that combines biophysical aspects with processes intrinsic to social systems and, therefore, is irreducible to energetics. The level of reductionism in the history of EET covered here varies from the energetic dogma[8] of Eduard Sacher (1834-1903) and Wilhelm Ostwald (1853-1932) to the more elaborate interpretations of value and social phenomena of Patrick Geddes (1854-1932) and Otto Neurath (1882-1945).

Eduard Sacher, an Austrian pioneer in the use of energy accounting of human societies, claimed that the basis for a rational economic science would inevitably come from the natural sciences, as economic development could ultimately be defined as a human pursuit for the greatest possible amount of energy available in nature (Sacher, 1881, p.3-5). Alongside Podolinskii, he was a pioneer in the

[8] The term energetic dogma is used here, as Georgescu-Roegen (1979, p.1024) did, meaning both that "…matter must in the ultimate analysis reduce to the only 'substance', energy" and that "…only energy matters for mankind's specific mode of existence", with an emphasis on the latter.

application of analytical methods to assess energy stocks and flows, attempting to correlate cultural development and energy availability. Sacher thought would be possible, and intended, to draw a general history of mankind based on energetic consumption per capita (Martinez-Alier, 1987).

Ostwald (1909) reached similar conclusions, which granted him recognition as a precursor of ecological anthropology (White, 1959). However, Ostwald never worked on an empirical investigation of how humans transform or adjust to available energy. He based his incursions into the social sciences on an energetic imperative, comprised of not only a reproach to neoclassical economic theory, but also of a different view of human history and a moral guide for social life, both based on solar energy use by humans. His neglect of the role materials played, which apparently could be reduced to the energy necessary to create or transform them, also hints toward a reductionist position on cultural development[9]. In a broader context, Ostwald was part of the formation of a social energetics branch of the mechanistic school of sociology[10] (Sorokin, 1928), having edited a series called *Annalen der Naturphilosophie* between 1901 and 1921 in which the contributions of authors such as Ernest Solvay (1838-1922) and Johann Žmavc (1871–1956) corroborated his views on the links between energy and cultural development.

Intermediary positions on energetic reductionism can be found in the works of authors linking social energetics and Marxism. The first of them was Podolinskii, a Ukrainian physician who looked at economic processes as composed of physiological energy flows. Writing between 1880 and 1883, he was the first to develop the concept of energy efficiency applied to energetic inputs in land use (as well as in human labor, with the claim that energetic productivity of labor must be equal or greater than its energetic cost to workers, what was later referred to as the “principle of Podolinskii”), also measuring energetic input-output ratios in

[9] Ostwald was fond of Comte’s hierarchical view of science. He was president of Haeckel’s Monist League from 1911 to 1914, displaying a religious approach to science, energy and nature.

[10] Key works related to the mechanistic school of sociology at the time are Winiarski (1898) and Carver (1924).

agriculture. The relations between natural sciences and Marxism were addressed by the author around the notions of an energetic theory of value (tentatively consistent with what was referred to as Marx's labor theory of value) and productive forces so as to match surplus labor (and ultimately surplus value) with physical reality (Podolinskii, 2004 [1881]).

An important school of Marxist EET appeared in Russia in the first quarter of the 20th century[11]. As yet, it has received little acknowledgement as part of the history of EET, probably a late consequence of the frustrated dialog between Marxism and ecological economics[12]. Weiner (1988) and Gare (2002) stress the role of early Soviet conservationist ideas and initiatives respectively in environmental thought and history, without, however, linking these developments to EET. Vernadskii (1924), a Russian geochemist writing in the 1920s, studied the ideas of Podolinskii and argued that his contemporary Russian thinkers had independently arrived at similar ideas. The works of at least three Russian thinkers of the period stand out in the history of EET: Aleksandr Aleksandrovich Bogdanov (1873-1928), Nikolai Ivanovich Bukharin (1888-1938) and ecologist Vladimir Vladimirovich Stanchinskii (1882-1942). Although neither Bogdanov nor Bukharin went through the energetics statistics, both believed that the Marxist concept of productive forces could, at least partly, be explained in energy terms. Bogdanov had been influenced by Ostwald, correlating energetic processes and natural selection as a means in understanding the workings of human organizations (Gare, 2000; Vucinich, 1989). Bukharin (1925) tried to reconcile historical materialism with social energetics, making use of the principle of Podolinskii (Martinez-Alier, 1987). Energy exchanges between society and nature would allow social reproduction, with different possible dynamic social equilibria being properly described in energy units. Stanchinskii (1931a), unlike Bogdanov and Bukharin, took up the challenge to calculate energy balances in natural environments with implications to social and, particularly, to economic systems. His studies in ecology included energy

[11] See Chapter 3.

[12] The positions of Marx and Engels in relation to EET are still open to debate. See Foster (2000) and Burkett (2009).

transformation and degradation along the food web, using the entropy law to explain the decreasing amounts of biomass in higher levels of the trophic ladder. Stanchinskii hoped to be able to calculate the productive capacities of a given ecosystem and plan economic activity accordingly (Weiner, 1988). Notwithstanding his energetic approach, he adopted a historical, dialectic view for the description of the relations between nature and human societies, somewhat like Engel's Dialectics of Nature and, therefore, a more acceptable scientific approach in the political atmosphere of oppression under the yoke of Stalin (Martinez-Alier, 1987).

In contrast, the irreducibility of social phenomena to energetics can be drawn from Otto Neurath's concept of unified science. Although Neurath's philosophical view of science entails an apparent reductionism, with unified science meaning "… physics in its largest aspect, a tissue of laws expressing space-time linkages" (Neurath, 1983 [1931], p.49), there is no "ontological reduction of entities and concepts" (Cohen & Neurath, 1983, p.vii). The emphasis of unified science on physics matches the biophysical approach to economic processes, whereas knowledge accumulation would come from interconnected fields of science. The result would be a coherent scientific encyclopedia in which a shared language and methodological tenet, empiricism, would leave no room for hierarchy between fields. Sociology would generate new knowledge through the lens of a social behaviorism, irreducible to energetic analysis.

Patrick Geddes (1884) followed John Ruskin (1819-1900) and his moral and aesthetic case against industrialization and the political economy of the time (Ruskin, 1985 [1862]), in opposition to the aesthetic energy concept (the energy derived from beauty or physical attraction) of the mechanistic school (Winiarski, 1898). Geddes (1884a) shows a concern that economics was becoming less based on physics, biology, psychology, sociology and ethics, and that economists were busier with exchange and abstract statistics and models than with developing a discipline that would embed economic processes and living organisms in the physical world. He criticized the "attempt to reduce all sociology and morals to biology and physics" (p.949) and, anticipating Neurath, argued for the need to conceive a plan in which the different fields of scientific inquiry would work

together to form a better theoretical and practical understanding of reality and, more specifically, a better economic science.

The views of biologist Lancelot Hogben (1895-1975) provide yet another example of opposition to energetic reductionism. Hogben claimed that energy accounting of human societies should be coupled with a historic and cultural approach to analyzing social phenomena, a combination capable of forming a better notion of economic value. Human needs would be grounded on biophysical aspects by means of a “science of social technology”, while human preferences, driven by ostentation as a universal species characteristic, would be best described using “the laboratory materials supplied by anthropology and social history” (Hogben, 1939, p.101). These laboratory materials, according to Hogben, would include techniques and experiments in social psychology, as well as analyses of the effects of education over human preferences. Energetics could then take a central role in a “scientific economy of social relations in which the concept of free energy would take the place of free trade”, whereas “[t]he true and lawful goal of the social sciences is that human life be endowed with new discoveries of social organization to use our newly-found knowledge of nature” (Hogben, 1938, p.622). Hogben, as well as Neurath and Geddes, seems at first to argue for a reductionist view of cultural development. A closer examination is needed to realize that the emphasis on the natural sciences, and on social energetics in particular, is accompanied by the acknowledgement of emergent properties and intrinsic processes of social systems more suitably explained by the social sciences.

The competing approaches presented above illustrate the different levels of reductionism adopted toward the issue of energy as a determinant of cultural development. Their worldviews varied in an ontological sense. Sacher, Ostwald and the social energetics branch of the mechanistic school of sociology reduced reality to phenomena governed by energy, the most basic entity that underlies both natural and social processes. Energy availability and use by humans would provide sufficient elements to unveil a general history of mankind. Marxist thinkers who acknowledged the role of energy in the development of “productive forces” rejected such a radical ontological reductionism. Instead of replacing historical materialism with social energetics, they argued for their complementarity, as social

reality would also be shaped by the intrinsically social, political and cultural aspects related to labor and class struggle. However, the best examples that social energetics did not entail only reductionist views would be Neurath's unified science, Geddes's moral and aesthetic arguments and Hogben's view on human preferences. In either case, a strong claim in favor of social energetics is accompanied by a cautious reminder that the reality of social systems cannot be solely explained in terms of energy. They saw social energetics as a foundation for economic science, but this would be far from implying that physics alone could explain social phenomena or give a satisfactory account of the history of mankind.

### 2.1.2 Normative aspects involving resource distribution, social ideals and policy-making

A second source of intellectual diversity within EET of the period relates to the normative implications of the link between energetics and social provisioning processes, leading to questions regarding resource distribution, social ideals and the policies associated with them. Markets, economic planning, technology and the Darwinian theory of evolution were key issues showcasing a variety of approaches among thinkers (e.g. Geddes, Ostwald, Neurath, Hogben and Soddy) who were jointly called "neo-Saint-Simonian social engineers" by Hayek (1980 [1952]). The acknowledgment that biophysical processes have a large impact on social provisioning and cultural development led to different prescriptions in terms of social ideals and the necessary policies to achieve them. Three broad, partially overlapping groups can be identified according to their views on resource scarcity and distribution, social organization, and the role of technology and natural selection: ecological utopians, technocrats and social Darwinists.

Martinez-Alier (1987) defines as ecological utopians the left-wing current of social energeticists of the time who did not support the idea of a future of abundance and human domination over nature, therefore arguing in favor of more egalitarian forms of social organization while living within given biophysical boundaries. Unlike Saint-Simonian utopians, these authors rejected a totalitarian, technocratic utopian agenda. They based their visions and social ideals on the natural sciences (mainly energy accounting and statistics) and related revolutionary movements with the

need for an ecological economic planning program. Hence, one could add that these authors might be described as scientific utopians. Josef Popper-Lynkeus (1838-1921) and Carl Ballod-Atlanticus (1864-1931) would best fit that profile, as well as Neurath, who was to a large extent influenced by them (Sandner, 2014).

Popper-Lynkeus (1912) assessed the German economy in terms of the demand for natural resources that would suffice to feed the entire population. He quantified the amount of human labor that such an endeavor would entail and proposed a declining use of exhaustible resources, while speculating to what extent fossil energy could be replaced by renewable agricultural energy. He was a socialist, fiercely opposing social Darwinists and arguing that social conflicts cannot be described or analyzed by evolutionary natural selection processes. He was not altogether against markets, but claimed instead that markets are not meant to be universal entities, that they should be restricted to certain sectors and commodities, as well as subject to regulation and planning. He developed his own energy balances, which resulted in a pessimistic view of the future that called for population control.

Ballod-Atlanticus shared much of Popper-Lynkeus's ideas, although his account is not as systematic as those of Popper-Lynkeus. Instead, Ballod-Atlanticus (1919) focused on technical progress and efficiency (in a biophysical sense) as a means to satisfy the needs of present and future human generations. The ecological economic accounting of Popper-Lynkeus and Ballod-Atlanticus, serving as a tool for an attempt in social planning based on scientific utopias, had a strong influence on Neurath (1925), who argued that it was possible to achieve a rational process of calculation and planning of a socialist economy based on physical units. A choice would have to be made between several different possible (scientifically utopian) outcomes, and ecological concerns would have to be considered (also in an intergenerational perspective), such as the availability of energy, materials and human labor.

Nobel Laureate chemist Frederick Soddy (1877-1956) could also be regarded as an ecological utopian, even though his approach to EET and the focus of his criticisms to mainstream economics differed to a large extent from those of Neurath, Ballod-Atlanticus and Popper-Lynkeus. Their ideas were more in line with

the socialist views that pervaded German-speaking countries in the 1910s and 1920s; therefore, their main concern was related to the possibilities of biophysically sound economic planning. Alternatively, Soddy attempted to expose, from the standpoint of the natural sciences, the shortcomings of mainstream macroeconomics and its ill-advised implications for social welfare. According to him, economics lacked a proper foundation in physics. Payment of interest, for instance, would be conditioned to economic growth and, in the absence of it, someone would inevitably end up poorer than before. However, growth would mainly be a physical variable – not an economic one – as it depended intrinsically on the availability of energy and material resources (Soddy, 1922). Soddy then affirmed that Keynes's stance on economic growth was based on the optimistic assumption of a continuously better future, in opposition to the idea that economic processes are bound by the laws of thermodynamics (Soddy, 1926, p.88). By treating debt as wealth, the accruing positive interest on the latter (a social convention to Soddy) would falsely lead economists to a perception of continuous accumulation, while physical reality would entropically go in the opposite direction, even if at first hardly detectable due to the massive size of natural processes in relation to economic processes. The entropic argument would also entail a strong concern about the intertemporal allocation of exhaustible resources, especially given Soddy's lack of belief in the substitution between natural and man-made capital. He argued that there was an excessive investment rate in the economy, a claim linked to a central concern about the relationship between investment and physical supply. Many investments would not augment productive capacity, and many others would, instead, squander exhaustible resources, all being "economically" justified by attractive monetary returns. How could the burning of fossil fuels, for example, be handled as an accumulation of productive capacity? Even if leading to a larger base of productive capital, the resulting entropic rise and irreversibility of the process would frame it at best as a trade-off.

The American technocrats of the 1930s or Technocracy, Inc., a self-appointed designation (Scott et al., 1938), led by Howard Scott and intellectually influenced by M. King Hubbert (1903-1989) and Stuart Chase (1888-1985), drew a quite different set of implications from the precepts of social energetics. Their radical technological optimism led to the support of unbounded economic growth.

Although they recognized the biophysical restrictions imposed by the eventual depletion of natural resources, their faith in the abundance of natural endowment and man's mastery over it have led to a concern not about the actual limits of productive capacity, but about a dragging effective demand. Social insecurity and want would be the inevitable end of a society governed by a price system in which debt is the sole source of wealth. The monetary system would bear no direct relationship to reality, as the technocrats learned from Soddy. Rather, it would create an uneven income distribution that favors political interests and halts economic development, even "in the face of rapidly-increasing industrial competence" (Elsner, 1967, p.118; Scott et al., 1938, p.26-27, p.35). The emphasis on maintaining demand rather than supply is strikingly at odds with the precautionary standpoint of most social energeticists of the time. However, the critique toward the detachment of mainstream economics in relation to the biophysical world is a common element, and even the more cornucopian views and prominence of technicians in society could be said to have been shared – only up to a point – by thinkers such as Ballod-Atlanticus and Soddy. In addition, the energetic reductionism and social Darwinist tendencies of the technocrats resemble those of Ostwald[13].

A third type of approach came from the combination of social energetics and Darwin's evolutionary theory of natural selection, despite the debate held at the time on the apparent contradiction between the professed inexorability of the entropy law and the increasing appropriation of energy in self-organizing biological evolutionary processes (Adams, 1919, p. 151, p.156). Authors such as Boltzmann (1886), Pfaundler (1902), Ostwald (1909) and Lotka (1925) propounded the use of energy as the key determinant of natural selection processes, in which species would thrive if able to appropriate and make use of greater amounts of energy. Their conclusions led to the assumption that there would also be a link between energetics and the evolution of interacting human groups, i.e. there would be a competition for the maximization of energy use within the same species, and not

[13] For some of the more morally contestable political ideologies of the technocrats, see Martinez-Alier (1987, p.145).

only between different species. This theoretical “leap” – social Darwinism – entailed the old Malthusian ideology of the “struggle for existence” in the context of checks on human population growth (Petersen, 1979, p.219-223), seeking a scientific justification for social inequality and neglecting the emergence of other factors in the historical determination of social outcomes (e.g. class, race, gender, nationality, etc.).

The worldviews of ecological utopians, technocrats and social Darwinists entailed different ideologies and theories, mainly concerning resource scarcity and distribution, social organization, and the role of technology and natural selection. The theories of ecological utopians and social Darwinists, respectively the propositions of a rational, biophysically-based process of economic planning and intra-species natural selection guided by appropriation and use of energy, acknowledged resource scarcity as a barrier to cultural development. Nevertheless, the ideological implications drawn by each group were diametrically opposed: egalitarianism and “survival of the fittest”. The technocrats, conversely, predicted a future of material abundance due to the prowess of technical progress. Such an exacerbated cornucopian view led to an ideology based on the ideal of a technocratic bureaucracy.

The views of ecological utopians, technocrats and social Darwinists have also varied (intra- and intergroup) in other aspects pertaining to the consequences of the entropy law to human life. Interpretations ranged from an absolute pessimism toward the heat death of the universe (Adams, 1919) to intermediary, realistic implications in terms of food and population control (Popper-Lynkeus, 1912) or of the depletion of exhaustible resources and necessity of an energetic “solar budget” (Clausius, 1885), and finally to more optimistic views of technology (Hogben, 1938) and the self-organizing possibilities in open systems (Auerbach, 1910). Also, the notion of the irreversibility of natural processes involving energy flows and the inevitable heat death of the universe led some of these thinkers (e.g. Adams and Ostwald) to the belief that thermodynamics would display a religious or spiritual content, a position fiercely opposed by Popper-Lynkeus, Neurath, Soddy and other authors trying to establish social energetics as a scientific endeavor no different from analytical mechanics.

## 2.2 The formation of a scientific metaparadigm

The previous sections have argued that the intellectual diversity of EET in the period in question can be viewed as the result of dissimilar ideas mainly concerning (i) energy as a determinant of cultural development and (ii) the normative aspects involving resource distribution, social ideals and policy-making. On the other hand, social energetics has been identified as a foundation of EET. These claims appear to signify the formation of a scientific metaparadigm in a Kuhnian sense.

Kuhn's (1996 [1962]) concept of a scientific paradigm has been the subject of analysis and debate among philosophers of science. The first definition he gives relates to scientific achievements which share two characteristics: they are "sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity" and "sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve" (p.10). The concept of scientific paradigm would transcend overt rules and prescriptions, drawing also upon more diffuse notions such as scientific traditions, political institutions, organizing principles and epistemological viewpoints. His theory emphasizes the revolutionary character of science, which would be composed of reiterated cycles involving changes in theoretical structures according to the following phases: pre-science, normal science, crisis, revolution, new normal science, and new crisis (Chalmers, 1999, p.108). The transitions, first from pre-science to normal science and, subsequently, from normal science to new normal science, would be effected by the adoption of a new theoretical structure able to establish a new scientific paradigm by which members of a given scientific community would abide. Periods of normal science would consist in the expansion and consolidation of the adopted paradigm, solving problems with the aim to corroborate its validity. Normal scientists would not challenge the paradigm or seek novelties beyond its realm, until an anomaly becomes so blatant that adherence is shifted from the current paradigm to a new one in synch with the latest evidence.

Masterman (1970) differentiates Kuhnian paradigms into metaphysical, sociological or construct paradigms. The metaphysical paradigm or metaparadigm would be a philosophical sort of paradigm, different from the most common sociological and construct interpretations of the concept (i.e. a set of research habits and puzzle-solving accomplishments following unprecedented and open-ended scientific achievements). Metaparadigms would precede the sociological paradigm, bearing a wide meaning that resembles those associated with the Kantian concept of Weltanschauung or metaphysical worldview. Masterman (1970, p.65) equates the concept of metaparadigm to the following expressions used by Kuhn (1996 [1962]): a set of beliefs, myth, successful metaphysical speculation, standard, a new way of seeing, an organizing principle governing perception itself, map, and something which determines a large area of reality. According to Eckberg and Hill (1979), a metaparadigm would correspond to unquestioned presuppositions in a cognitive sense, assuming the broadest level of generality among the three interpretations of the paradigm concept. A metaparadigm thus "acts as an encapsulating unit, or framework, within which the more restricted, or higher-order, structures develop" – with "'higher' refer[ring] to more restricted levels of belief-consensus" (p.927). A determined metaparadigm would, therefore, be necessary (although not sufficient) for the sociological and construct paradigms to develop. As in the meaning of Weltanschauung, metaparadigms would correspond to metaphysical assumptions relating to philosophical, cultural or religious perceptions which include descriptive and normative assessments.

In this sense, social energetics could be considered the foundation of a metaparadigm shared by ecological economic thinkers between the 1880s and 1930s. There was a broad consensus that economic processes are subject to natural laws – mainly thermodynamic laws – and, thus, a proper understanding of the social provisioning processes can only be achieved by a biophysical approach to economic science. Conversely, within such a wide definition of metaparadigm as "encapsulating unit or framework", interpretations about energy as a determinant of cultural development and the normative aspects involving resource distribution, social ideals and policy-making varied to a point which prevented the formation of more restricted levels of belief-consensus. Hence, the diversity of

thought observed, at least for these two points, might have played a role in the absence of a sociological paradigm (and in turn, of a construct paradigm) within EET. There was not an integrated community of practitioners, a requirement for the identification of sociological paradigms (Eckberg & Hill, 1979, p.928). There were at best competing communities, e.g. ecological utopians, technocrats and social Darwinists, although overlapping beliefs and scholars among them cannot be neglected, especially between the latter two. In addition, the formation of a sociological paradigm within EET faced the challenge posed by the sociology of disciplinary boundaries, with natural (physicists, chemists, biologists, engineers) and social scientists (economists, anthropologists, sociologists) working on the same issues but coming from different backgrounds and communities. The diversity within EET might also have meant that their scientific achievements have not managed to create a new set of research habits in a fairly rigid and elaborated framework of beliefs, something that a full-scale Kuhnian scientific paradigm would entail.

The claims that social energetics served as the foundation of a Kuhnian scientific metaparadigm between the 1880s and 1930s, and that a contemporary diversity of thought hindered the formation of a full-scale paradigm, add to the relatively sparse, but growing, literature on the history of EET, also contributing to differentiate it from the history of environmental economic thought. Furthermore, the results above might inform current debates on the methodological pluralism of ecological economics. Looking into the development of ecological economic ideas in previous periods and how metaphysical, sociological and construct paradigms may have existed or not provides a fresh perspective on the matter. The issue of methodological pluralism can be interpreted in terms of levels of belief-consensus, either in a social or philosophical sense.

## 2.3 Scientific paradigm and metaparadigm in modern ecological economics

Somewhat corroborating the main argument here, Røpke (2004, p.297) contends that EET before the 1960s “did not succeed in establishing the new [ecological economic] perspective, because they did not provide answers to the most pressing

problems of the time when they were writing. Other problems were considered more relevant by the academic community as well as by broader social groups". It would only be in the early history of modern ecological economics that EET actually set in motion a process of paradigmatic consolidation, in an attempt to "embrace the ideas and processes that led to the formal establishment of the journal [Ecological Economics] and the society [ISEE]" (p.294). By then, a combination of social and cognitive factors would be active. These include environmentalist movements, growing acceptance of transdisciplinary studies, increase in world population and pollution, natural resource scarcity and the rise of systems ecology. Positive feedbacks among these factors led to modern formulations of the relationships between ecology and economics based on thermodynamics, fostering attempts to formalize a standalone scientific discipline.

However, Røpke (2004) also includes developments related to the history of environmental economic thought in her early history of modern ecological economics (p.299-300). The allocative approach of mainstream environmental economists clearly does not share the scientific metaparadigm of EET discussed above, represented at that stage by thinkers such as Boulding (1966), Daly (1968), and Georgescu-Roegen (1971). Therefore, the "gestation period" of ecological economics, in the light of Røpke's account, would entail an inconsistency, with the attempt to build sociological and construct paradigms being undertaken while lacking a consolidated metaparadigm or while there still existed competing metaparadigms. The inconsistency would be striving for more restricted levels of belief-consensus without a common encapsulating unit, metaphysical assumptions or Weltanschauung. The allocative approach of mainstream economics does not support social energetics as a foundation and, thus, competes with the biophysical approach both philosophically and as a source of influence on policy makers. Divergent metaphysical frameworks prevent the formation of high-level belief-consensus as well as of a well-established image and message to decision makers and society at large. As put by Røpke (2004, p.312):

> "[d]espite the agreement on these general issues [commitment to environmental issues and a need for transdisciplinary work and pluralism], the field of ecological economics was obviously born with some in-built tensions. The participants in the establishment of the field represented a broad combination of disciplinary

> backgrounds, and basically different views on the meaning and practice of science were represented, as well as basically different perspectives inside the discipline of economics".

After the foundation of ISEE, these "in-built tensions" have led to the already mentioned debate on the benefits and limits of the adoption of a broad methodological pluralism by ecological economists. These events could also be explained in terms of the permanence of the same inconsistency observed in the early history of modern ecological economics, i.e. seeking for more restricted levels of belief-consensus while lacking a joint scientific metaparadigm. Negative outcomes of such inconsistency – a word that conveys a more negative connotation than the expression used in the debate, "methodological pluralism" – would include a lack of internal coherence and scientific relevance (Baumgärtner et al., 2008; Lo, 2014; Spash, 2012). Another problem would be the sociopolitical dominance arising from the competition between such metaparadigms (Söderbaum, 1999).

In this sense, calls for a proper set of ontological, epistemological and methodological foundations as means to a more consistent and scientifically relevant research programme for ecological economics (Lo, 2014; Spash, 2012; Tacconi, 1998) could be interpreted as a call for common grounds in terms of a shared scientific metaparadigm. The concept of structured pluralism has also been used to argue for the need of more epistemological coherence at lower levels of belief-consensus. Dow (2004, p.287) defines structured pluralism as "the advocacy of a range of methodological approaches to economics which, like the range of social structures, is not infinite", a stance opposed to an infertile, "unstructured pluralism or eclecticism, understood as an absence of selection criteria, or 'anything goes' (…)" (Dow, 2007, p.448).

Social ecological economics, as proposed by Spash (2013), would represent an alternative that conforms to the tenets of structured pluralism, presenting a scientific metaparadigm based on the biophysical approach to economic processes – as in the 1880s-1930s period – which could be worked upon into higher-order structures of belief-consensus, without the competing worldviews (though acknowledging the overlaps) offered by what Spash calls the other two camps of ecological economics: new resource economics and new environmental

pragmatism. While the former's scientific metaparadigm relates to the allocative approach, the latter's presents a strong cultural element that shapes its approach to the interlinkages between ecology and economics. According to new environmental pragmatists, ecological economists must be politically influential and goal-oriented and, hence, favor "methods and concepts because they are deemed to be effective under current political conditions and economic institutions" (Spash, 2013, p.354).

Based on this view of the sociology of ecological economics, it could be stated that there are currently at least three competing metaparadigms within the discipline, with one of them maintaining the foundation of the EET of the 1880s-1930s. Notwithstanding which metaparadigm turns out to be more successful in addressing environmental problems, it is important to acknowledge that each of them tends to evolve into different sociological and construct paradigms. A precautionary position would imply that, instead of trying to merge different metaparadigms, it would be more productive to treat them as different and competing approaches. It does not mean a rebuttal of methodological pluralism, which exists within metaparadigms in a more structured manner, as was shown here for the analyzed period. Furthermore, it does not aim to suppress any of the competing metaparadigms, but to foster dialog and criticism and, meanwhile, to identify and deal with sociopolitical dominance.

If a single metaphysical metaparadigm is adopted by the community of ecological economists, the formation of sociological and construct paradigms might move forward with an increased tempo and intellectual, cultural and political strength, unimpeded by internally irreconcilable worldviews.

## 2.4 A forgotten school of EET, 1880s-1930s

Going back to the historical account of EET in the 1880s-1930s, the intellectual diversity presented above also evinces how the history of EET is still subject to further historical and philosophical studies. The work of particular figures deserves a more detailed assessment in the context of EET, as in the case of Sacher, Podolinskii, Geddes, Popper-Lynkeus, Ballod-Atlanticus or Hogben. The history of

EET would also benefit from attempts to identify the contributions of collective intellectual movements or schools of thought. The ideas of Neurath and Popper-Lynkeus, for example, have motivated what has been dubbed the “Other Austrian Economics” (Nemeth, 2013), deserving a dedicated analysis within the history of EET. The body of knowledge produced by Soviet thinkers in the 1920s would be an instance in which Western literature on the history of EET has failed to recognize the importance of pioneering research on the links between community ecology (i.e. the study of the relations between living organisms and between them and their non-living environment) and economic science and policy. Therefore, the next chapter will focus on what Foster (2015, p.1) called “early Soviet ecology, characterized by revolutionary ecological theories and key conservation initiatives from the 1917 revolution up to the mid-1930s”.

# 3 SOVIET ECOLOGICAL ECONOMIC THOUGHT UNDER *NARKOMPROS*

Not much attention has been paid to the contributions of Soviet EET to the understanding of the relations between ecology and economics. The disastrous environmental policies of the Stalinist and subsequent Soviet administrations partly explain the misguided historical view in Western countries regarding the level of environmental concern and related ideas in Russia (Gare, 2002). The Soviet political emphasis on industrial production, the turbulent and often opposed views between socialists and nature conservationists and the alleged frustrated dialog between Marxism and ecological economics (Burkett, 2009) are additional factors that might have led to the assumption that there is little to learn from Russian (and Soviet) history to the progress of environmental social science[14] as a whole and, in particular, of EET[15]. As will be shown below, Soviet thinkers actually produced relevant and original ideas in the context of EET, having influenced the ensuing development of disciplines such as ecological economics, agroecology, ecological anthropology, political ecology, and political economy of the environment.

The advancements in ecological science and policies for conservation proposed by Russian thinkers of the 1920s and 1930s had implications to the theoretical development of economic science and associated initiatives to plan economic activity. The link between ecology and economics forged by such thinkers was in synch with the definition of EET adopted in the previous chapter, in which

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[14] Environmental social science is here understood as human–environment interactions research (Moran, 2010). Vaccaro et al. (2010, p.1) explain the concept as both "the realization that landscapes and the multitude of components they contain cannot be understood without serious consideration of past and present human communities" and "the recognition that human societies cannot be understood without analyzing their interactions with the environments that supported them".

[15] Carpenter (1939, p.354) attributed the ignorance of Western scholars in relation to Russian works on ecology to the "apparent difficulty of the language", despite the fact that many of them had abstracts in English, German or French.

economic phenomena are addressed through the analysis of the flows and stocks of energy and matter, with an immediate impact on the processes of social provisioning and cultural development.

Soviet ecological science can be divided into three distinct, consecutive phases throughout the 20th century: early, middle and late Soviet ecology (Foster, 2015). The first phase, early Soviet ecology, stretches from the 1917 revolution up to the tightening of Stalin's control over Soviet science in the mid-1930s. Soviet studies on the intertwining between ecology and economics during the 1920s and 1930s were part of a wider effort of the People's Commissariat for Education – *Narkompros* – under the leadership of Bolshevik Anatolii Vasilevich Lunacharskii (1875–1933), with Lenin's support, to foster culture and science in Soviet Russia. This initiative was called *Proletkult*, meaning a culture which

> "would include a new science conceiving nature and humanity as self-organizing activities/resistances, which would enable the proletariat to properly understand themselves and their potentialities and to organize democratically" (Gare, 2002, p.59).

The body of new knowledge produced during this period on theory and application of community ecology was by far unmatched by similar developments in Western countries (Gare, 2002; Weiner, 1988). The creation of natural reserves for scientific research – the *zapovedniki* – put in practice an unprecedented nature conservation plan[16] and promoted the theoretical advancement of ecology, including policy recommendations in terms of an ecologically sound economic planning programme.

The rise of Stalin's repressive state meant a drastic change in the course of Soviet ecology, with an aggressive politicization and bureaucratization of science, from

[16] Based on the size of the *zapovedniki* created under *Narkompros*, one could state that the first decade of the Soviet regime was one of the most significant initiatives among modern conservationist movements. By 1927, the total protected area (including *zapovedniki* and other types of reserves, such as gaming preserves, the *zakazniki*, and "monuments of nature", *pamiatniki prirody*) totaled almost seven million hectares (Weiner, 1982, p.48), a figure very similar to the total area of the acclaimed American national parks in the same year (although the total area of American national forests and grasslands, regarded as public lands managed by the government and created mostly during the presidency of Theodore Roosevelt, was at least ten times bigger than the total area of the national parks).

the mid-1930s until Stalin's death in 1953. This led either to the elimination or ostracizing of many of the leading ecologists who disagreed with Trofim Denisovich Lysenko (1898–1976), a dominant figure in Soviet biology until the late 1950s, who dismissed studies on community ecology in favor of a more utilitarian approach to the management of Soviet natural resources[17] (Gare, 2002). The power of Lysenko to enforce theory and policy on environmental issues[18], accompanied by rapid industrialization rates fostered by the material demands of the Second World War and the ensuing Cold War, would lead to the widespread Western view of the USSR as a foe of the environment.

In the second half of the 20th century, anthropogenic impacts over increasingly larger natural processes became more apparent, with unexpected and non-linear effects over the stability of ecosystems. In consequence, the focus of ecologists turned to interdisciplinary studies that might help to explain or predict world-scale phenomena in terms of the interactions between living organisms and the environment, as well as to make recommendations on how humans could best preserve or improve the environment for their own benefit (Budyko, 1980). Thus, the goal of the then emergent science of global or biospherical ecology would be to

> "forecast possible changes in the biosphere under the influence of human activities in various stages of economic development. Since long-term economic planning activities of large capital investments will be greatly influenced by such forecasts, the latter must be highly reliable and this requires a further development of global ecology (…)" (Budyko, 1980, p.16).

[17] Lysenko's research agenda was centered on acclimatization studies, which aimed to improve agricultural productivity by means of the artificial transformation of nature, removing species from their original habitats and inserting them into new ones (Foster, 2015). Ecologists previously working on community ecology who wanted to continue their work had no choice but to abide by the acclimatization paradigm.

[18] Nevertheless, non-academic environmentalist movements astonishingly remained an important political voice throughout the Soviet era, often challenging the decisions of government officials on environmental issues. This observation leads to interesting, though speculative, remarks on the contradictions and intricate social norms of Soviet and Russian culture (Weiner, 1999; Gare, 2002).

Moreover, the 1960s and 1970s saw a reinvigorated conservation movement in the Soviet Union, which at that time counted with the largest conservation organization in the world[19]. The combination of a renewed Soviet ecological thought, attentive to the dangerous onset of anthropogenic changes to ecosystems on a global level, with strong environmentalist organizations led to a gradual improvement in the environmental track record of the Soviet Union from the 1980s onwards (Foster, 2015; Weiner, 1988a).

Budyko[20] (1980) acknowledges how this late Soviet ecology, wary of global environmental perils, was only possible due to scientific breakthroughs that took place in the first three decades of the 20th century. Vasilii Vasilevich Dokuchaev (1846-1903), more commonly known for his pioneering work on soil science, had authored "[t]he first known studies [among Soviet ecologists] of interaction between living organisms and their environment in different natural zones (…)" (p.13). Vernadskii (1997 [1926]) probably gave the most important theoretical contribution, establishing the concept of biosphere as "an integral system whose development is largely determined by the activities of the living organisms" (p.13-14). To Vernadskii, the noosphere – the sphere of reason – acted upon the biosphere through human activities, constantly changing it.

Early Soviet ecology did not only make possible the development of late Soviet ecology, but also gave a lasting contribution to ecological science as a whole. It added significantly to the development of a broader array of scientific disciplines, including geography, anthropology, philosophy, economics, agricultural and sustainability science. However, the role of early Soviet ecology in the development of EET has not been properly acknowledged by ecological economists. Martinez-Alier (1987) is one of the few to associate early Soviet

[19] The All-Russian Society for the Conservation of Nature (*Vserossiiskoe Obshchestvo Okhrany Prirody* – VOOP) had more than thirty million members in the beginning of the 1980s (Foster, 2015).

[20] Mikhail Ivanovich Budyko (1920–2001) was himself a renowned figure of late Soviet ecology. Budyko was a climatologist specialized in the energetics at a global level. His energetic accounting of the Earth's surface granted him the Lenin Prize. He was also awarded the Blue Planet Prize in 1998 for his early contributions in climatology, including warnings on the acceleration of global warming and the conceptualization of the nuclear winter theory.

ecology and EET, although only partially and restricted to the roles of Bogdanov and Bukharin[21]. There were many other Soviet authors working during the 1920s and 1930s who genuinely deserve a place in the history of EET.

Bearing these elements in mind, this chapter is divided into the following sections, which aim to unveil the intellectual contributions of early Soviet ecology to EET. Firstly, the different currents of Soviet environmental thought present by the time of the 1917 revolution are presented. Early Soviet ecology is assessed as a scientific movement characterized by (i) its combination of rationalist and romanticist views toward nature and (ii) agreement with the views of Soviet left-wing Marxists of the 1920s. Secondly, social energetics is analyzed as a key element in the history of Soviet EET, joining an entropic view of natural and social systems with empirical methods and results that might provide support for an ecologically sound economic planning programme. Thirdly, the conservationism and views on economic planning of early Soviet ecologists are contemplated, including early notions related to the concepts of natural capital and ecosystem services, which are today central to theoretical debates among ecological economists. Finally, a few hypotheses are made in relation to the influence of 19th-century *narodnik* thought over the appearance of early Soviet ecology, in addition to more accredited inspirations coming from Western intellectuality.

## 3.1 Currents of Soviet environmental thought in 1917

Weiner (1988) identified three main groups within Soviet environmental thought by the time of the 1917 revolution: the nihilists, neo-romantic conservationists and rationalist romantics. The nihilists valued nature according to its potential for economic use and, therefore, conservation was to be guided by the maximization of material gains to humans. Only the more useful aspects of the mineral, animal and plant domains should be conserved. Species or landscapes which were not exploitable by man in any manner could be summarily eliminated. The domination

[21] See Chapter 2.

of science over nature was an important aspect of this utilitarian current of environmental thought. This approach to nature, and to the life sciences in general, has been termed Michurinism, due to the accomplishments of Ivan Vladimirovich Michurin (1855–1935), an horticulturist and dedicated practitioner of biological selection and transformation, who created different varieties of crop plants. Weiner (1985, p.244) defines Michurinism as

> "(…) a set of biological doctrines that (1) hold man's legitimate role as conqueror of nature and master of evolution (2) are based on a mixture of the teachings of Jean-Baptiste Lamarck with those of Etienne and Isidore Geoffroy Saint-Hilaire, and (3) employ the techniques of acclimatization, domestication and hybridization in the pursuit of largely utilitarian objectives".

Weiner (1985) traces the roots of Soviet nihilist environmental thought to 19th-century Russian science. French utilitarianism was an inspiration to Russian thinkers with Westernizing tendencies, such as the renowned revolutionary writer and literary critic Aleksandr Ivanovich Herzen (1812–1870). Within environmental thought, the best examples might be zoologists Karl Frantsevich Rule (1814–1858) and Anatolii Petrovich Bogdanov (1834–1896)[22]. In the 1860s, the idea of acclimatizing species for practical purposes, stemming from the inductionist theories of heredity of Jean-Baptiste de Lamarck (1744–1829) and Étienne Geoffroy Saint-Hilaire (1772–1844), matched the interest of Russian scientists for empirical research with direct implications for social life. The modernization of agriculture as means to an increased grain output was one of the top priorities among Russian policy makers, who faced the problem of unchecked population growth. Thus, acclimatization quickly became a priority for ecologists of the time, among them Dimitrii Konstantinovich Solovev (1886–1931) and Boris Mikhailovich Zhitkov (1872–1943).

On the other hand, there was also the nihilism of Slavophile intellectuals such as Nikolai Gavrilovich Chernyshevskii (1828–1889), who sought inspiration in the writings of English utilitarian philosophers Bentham and John S. Mill. However, Chernyshevskii developed his utilitarian approach "in its Russian manifestation as

[22] Not to be confused with Aleksander Aleksandrovich Bogdanov (1873-1928).

'rational egoism'", interpreted as "the doctrine underpinning the ideal socialist society", with a modified notion of self-interest in which "rationality appeared to change the very nature of egoism itself and convert it into altruism", reaching the "truly communal self-interest of the perfect society" (Peace, 2010, p.118-119). Although there is no clear evidence of the influence of this idealist interpretation on Soviet nihilist environmental thought, the materialist arguments and emphasis on rationality promoted by Chernyshevskii and other members of 19th-century Russian intelligentsia had a significant role in the intellectual formation of the nihilists of the 1920s.

The second group opposed such a utilitarian view of nature. The cultural-esthetic-ethical or neo-romantic conservationists were anti-industry, anti-modernization and acknowledged the intrinsic value of nature and the rights of non-human living organisms. According to them, industrial society was interfering with nature's harmony, resulting in a disequilibrium that would also negatively affect man's cultural development. Without nature's inspiration, man would be doomed to a life devoid of meaning. Neo-romantic conservationists were undoubtedly influenced by German idealism, although their ideas were also founded on more traditional elements of Russian culture[23], and even on the notion of patriotic duty. Their views regarding the natural world have also been associated with those of American transcendentalists, such as Ralph Waldo Emerson and Henry David Thoreau (Gare, 1996, p.265). Their most prominent representatives were Andrei Petrovich Semenov-Tian-Shanskii (1866-1942) and Ivan Parfenevich Borodin (1847-1930).

Semenov-Tian-Shanskii was an entomologist and son of Petr Petrovich Semenov-Tian-Shanskii (1827–1914), a prominent Russian geographer, explorer, statistician and member of the Petrashevskii circle[24] who studied under Alexander von

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[23] For example, pastoralist ideas associated with a simple, rural life surrounded by pristine nature were a recurrent theme among 19th-century Russian intellectuals. Their legacy led, in the 20th century, to the literary movement called *Derevenskaia Proza* (Village Prose).

[24] The Petrashevskii circle was a literary and philosophical group formed by progressive Russian intellectuals in the 1840s. They opposed the Tsar and inspired the *narodniki* revolutionary movements of the following decades. Notorious writers such as Dostoevskii and Shevchenko had tight connections to the members of the circle.

Humboldt. He wrote extensively during the 1910s on nature conservation, appealing to the scientific community and laymen alike to “save the ‘last refuges of Russian nature’” (Shtilmark, 2003, p.16). Amid the social turmoil that followed the 1917 revolution, Semenov-Tian-Shanskii stressed the need for an aesthetic approach to nature conservation and cultural development, in contrast with the materialist and productivist ethos of capitalist and socialist systems alike, both based on self-interest as a principle. Every species would have the right to live and develop to its full potential, and man would have a duty to safeguard nature (Weiner, 1982).

Borodin was a botanist and member of the Saint Petersburg Academy of Sciences. Although, as a product of his time, Borodin focused on empirical research in accordance with the mechanistic paradigm, his romanticism can be associated with his attempt to combine mechanism and vitalism, arguing for the presence of a metaphysical “vital force” in biological processes. To him, mechanistic science, based on physicochemical models and techniques, “had reached a point of diminishing returns and (…) could be saved only by a heavy reliance on metaphysics” (Vucinich, 1989, p.201). Borodin was influenced by German conservationist Hugo Conwentz (1855–1922) and envisioned the creation of vast national parks according to the American model.

The third current of Russian environmental thought stood in middle ground between nihilists and neo-romantic conservationists. Their views entailed anti-mechanistic, rationalist and romantic elements, which together would lead to the formation of an intellectual movement that is here referred to as early Soviet ecology. Their aim was the long-term protection and study of integral ecological communities, incorporated in natural reserves. Research based on observations of the *zapovedniki* would allow scientists to improve ecological science and, consequently, recommend appropriate economic uses of natural resources according to the ecological carrying capacity of a specific area or community (Weiner, 1988a). Like the nihilists, they favored a scientific approach to environmental issues, and many of them had been practicing acclimatization for decades. Concurrently, like the neo-romantic conservationists, they appreciated the value and complexity of the natural world, rejecting a purely utilitarian and

deterministic worldview. Nature was a model to emulate due to its harmony and efficiency, not something to be conquered and altered according to man's self-interest. On the contrary, man needed to respect nature's grand feats and care for its surrounding environment for his own sake. Gare (2002, p.58) refers to this current as "the rationalist wing of the neo-romantics".

Weiner (1982) affirms that early Soviet ecologists had been, up to the appearance of community ecology, nihilists themselves. Originally, the idea of acclimatization had a conservationist element, as it promised to make the use of natural resources more efficient, thereby preventing the irrational use of plant and animal stocks. As the levels of Russian biodiversity deteriorated throughout the late 19th and early 20th centuries, with declining populations of plants and animals, the nihilist and conservationist agendas seemed sufficiently divergent to cause a spat and the consequent flourishing of community ecology[25].

> "With time, however, the synthesis disintegrated into its two constituent parts: the striving to transform and conquer nature, and conservation. Ironically (…) these two postures, which were once linked in cooperative effort to modernize a wasteful serf economy, came to represent diametrically opposite conceptions of the man-nature relationship by the Soviet period" (Weiner, 1982, p.43).

Within the academic arena of ecological science, early Soviet ecology was marked by new goals, methods and contents. Its focus on community ecology had little in common with pre-war Russian ecological studies. According to Carpenter (1939, p.355), "the development of the community concept [in ecology] has everywhere been largely post-war". 19th-century ecological studies in Russia were mainly botanical. By the turn of the century, plant ecology studies flourished, as the Ministry of Agriculture commissioned surveys to support the planned emigration of peasants to Siberia and the Far East. This initiative could be seen as the first attempt to plan economic activity in Russia based on ecological precepts. A more

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[25] This spat was evident after Grigorii Aleksandrovich Kozhevnikov (1866-1933), an entomologist working at Moscow University and pupil of Anatolii Petrovich Bogdanov, was elected president of the Acclimatization Society. He used his position to undermine the utilitarian and interventionist ethos of the organization, prompting his fellow ecologists to support his views on conservationism and the need for the creation of the *zapovedniki*. After that, the Acclimatization Society fell into oblivion (Weiner, 1985).

profuse number of publications on animal ecology would only appear by the 1910s, in response to the locust problem faced by Russian agriculture at the time. Previous works were often restricted to autecology, which focuses on the interactions of individual organisms with their environment, rather than on interconnected biotic communities. Community ecology, synecology, or biocenology[26], the latter being the word of choice of most Russian authors (*biotsenologiia*), were often used as synonyms to describe this burgeoning field of ecological science in the 1920s and 1930s.

> "The term [community ecology] is not used in the restricted sense of studies of whole communities only, but to cover various aspects of synecology: the dynamics, structure, organization and functioning of biotic communities or parts of them, the interactions of the constituent species among themselves and with the habitat, and methods for their investigation" (Carpenter, 1939, p.354).

Studies in community ecology boomed during the 1920s, in its nihilist and rationalist-romantic variants. The content of the latter progressively shifted from acclimatization to the necessity of conservation. Their purpose was to understand the interconnections present in biotic communities, as well as its practical implications in terms of ecologically sound economic planning programmes. The number of ecologists interested in the rationalist-romantic approach to community ecology grew steadily under the auspices of *Narkompros*. Along with more prominent scholarly figures, such as Vladimir Ivanovich Vernadskii (1863–1945), Vladimir Nikolaevich Sukachev (1880-1967), Grigorii Aleksandrovich Kozhevnikov (1866-1933) and Stanchinskii, other important ecologists shared an interest in community ecology: the names Vladimir Vladimirovich Alpatov (1898–1979), Vladimir Nikolaevich Beklemishev (1890–1962), Aleksandr Nikolaevich Formozov (1899–1973), Georgii Frantsevich Gauze (1910–1986), Daniil Nikolaevich Kashkarov (1878-1941), Sergei Ivanovich Ognev (1886–1951), and Sergei Alekseevich Severtsov (1891–1947) would be only a few examples. Carpenter (1939) listed 517 noteworthy Soviet publications on the theory and method of

[26] The term biocenosis was coined by the German zoologist Karl August Möbius (1825–1908) in 1877, meaning a biological community.

community ecology between 1917 and 1937, not to mention the “very large literature on special economic biological and epidemiological problems” (p.367).

Early Soviet ecologists combined empirical methods and their objective results with a conservationist worldview that opposed the Promethean attitude of the nihilists. Their rationalist-romantic approach resembles those of thinkers referred to by Martinez-Alier (1987) as ecological utopians, such as Ballod-Atlanticus, Popper-Lynkeus and Neurath[27]. In both cases, the principles of the natural sciences were combined with a denial of the mastery of science over nature; both groups argued in favor of the existence of biophysical boundaries to economic development. The utopian view of early Soviet ecologists meant that the natural sciences would be instrumental in the support of revolutionary movements, particularly by means of a much-needed ecological economic planning programme. Their ecological utopianism stemmed, at least partially, from the ideas associated with left-wing Marxism.

## 3.2 Left-wing Marxism and early Soviet ecology

Soviet environmental thought, as every other field of Soviet science, did not escape the imprint of Marxist philosophy, as received by Russian Marxist theorists. The way in which Marxist thought was interpreted by leading Soviet theoreticians was, however, far from unanimous. In the context of nature conservation, Marxism would be another topic of dissent between nihilists and rationalist romantics.

Georgii Valentinovich Plekhanov (1856–1918), one of the founding fathers of Russian orthodox Marxism, saw nature as the means by which a historically determined proletarian revolution would unleash productive forces. His utilitarian view of Marxism matched the attitude of the nihilists toward nature. Under the rule of Stalin, this view would find its ultimate expression. Contrarily to Plekhanov, the so-called left-wing Marxists favored the anti-mechanistic science of the rationalist romantics, providing political and financial support for their research. Anatolii

[27] See Chapter 2.

Lunacharskii and Aleksandr Bogdanov were among the most important left-wing figures in terms of intellectual and political power during the 1920s, arguing for a democratic community without deep fissures between those who governed and those who were governed. This new social reality called for a new culture, the *Proletkult*, emancipated from the degenerate social norms tied to capitalism. The new culture would demand a different approach to science, one inspired by German idealism, as professed by Friedrich Schelling (1775-1854) and Alexander von Humboldt (1769-1859). They viewed nature as a live and integrated organism, with self-organizing properties, attributes that would also be valid for the proletariat. Hence, people would have the ability to organize themselves democratically and effectuate a revolutionary transition into communism (Gare, 2002).

Within the confines of economic thought, Barnett (2005) divides Russian revisionist Marxism into two different currents. By the end of the 19th century, debates on the application of Marxian ideas to the semi-feudal Russian economy were part of wider efforts to foster economic development in the country. The neo-Kantian revisionists, among them the then young legal Marxists Mikhail Ivanovich Tugan-Baranovskii (1865–1919), Petr Berngardovich Struve (1870–1944) and Sergei Nikolaevich Bulgakov (1871–1944), strived to develop an ethics-based economic methodology, one in which moral issues were of universal significance and, therefore, irreducible to class interests. They were opposed by Nietzschean or Machist revisionists, led by Lunacharskii and Bogdanov.

> “Both of these strands rejected the anti-individualism of Social-Democratic Marxism, but from rather different points of view. The Kantians promoted a return to the ethical foundations of socialism, whilst the Machians were more concerned with epistemological questions vis-à-vis the exalted status of class” (Barnett, 2005, p.47).

The empiriocriticism of Machist revisionists attempted to describe social phenomena based on the scientific method of the natural sciences, which would be itself conditioned by subjective social relations. On the one hand, they opposed Kantian aprioristic idealism in favor of the role of experience in processes of knowledge construction; on the other hand, it would be impossible to make objective statements about reality through human sensory lenses. It would only be

possible to “fill out the gaps in experience by the ideas that experience suggests” (Mattick, 2007 [1978], p.171). Although in favor of direct and immediate experience for understanding the world, Machism would be, in the eyes of Russian orthodox Marxists,

> “the theoretical-cognitive basis of the scientific views of most of the social-fascist theorists (…) [who] deprive science of its objectively scientific meaning (…) [and] shar[e] the lot of the reactionary-minded bourgeois physicists who preach indeterminism and idealism” (Uranovsky, 2011 [1936], p.172).

The revisionist character of the theories of Bogdanov (2016 [1923]) relates to his efforts to draw elements from dialectical materialism and empiriocriticism, aiming, however, to surpass Marx and Mach in their capacity to answer contemporary philosophical problems (Jensen, 1944). He called for a more sensuous view of the concept of matter and argued against Mach’s separation between action and contemplation, as it hindered the formation of an “adequate notion of causality as the explanatory connection between various elements of experience” (Boll, 1981, p.45). Only by overcoming the spat between the objective and subjective realms would the empiriocritics, according to Bogdanov, reach a monist system. Interconnections among the mental and physical complexes, mediated by man’s social nature and described by means of causal relations in a historical setting, would be the centerpiece of his so-called empiriomonism. For example, production and labor were historically determined instances made objective by the social organization of human life, stemming from group praxis through experience, the unending “practical interaction of man and nature” (Boll, 1981, p.47).

The Marxian status of class fitted well into Bogdanov’s philosophy of science, featuring as an objective phenomenon of a socially constructed reality, as means to reveal causal relations, and as a meaningful concept to understand the social character of knowledge. Dialectical thought was a form of causal principle, based on contradiction and countertendencies. However, Bogdanov found the dialectics of Marx and Engels unsatisfactory, especially when applied to mechanical phenomena, often confusing dialectical concepts with reality, a position which would be closer to Hegelian than materialist dialectics. Bogdanov (2016 [1923], p.182, italics in the original) viewed dialectics as an “organising process, occurring through the struggle of opposing tendencies”, while “[f]or Marx, the question is

about *development* and not an organising process (…) in the sense of the strengthening and increasing complexity of certain complexes, whether real or abstract". The following lines illustrate Bogdanov's notion of dialectics and exemplifies the sort of thinking that inspired early Soviet ecologists.

> "A body always moves in some *environment* – i.e. in spatial correlation with other bodies. This environment provides *resistance* to it, opposing a change in location by mechanical energy. Resistance can be significant or inconsiderable. In outer space it is very close to zero, in air it is noticeable in ordinary circumstances, in water it is very strong, and in hard bodies it is huge. But it does exist, and, to one degree or another, it continually weakens the force of movement. Movement continues until the force of resistance exceeds it. At a certain point equilibrium is achieved and the body comes to a stop. There are some cases when the resistance, growing quickly, produces in its turn an overbalance, and the body is forced to move backward – for example, the case of 'rebound' from a blow by a resilient body. What we have here is not only 'contradiction' or, more accurately, opposition – a term much more appropriate for materialist dialectics – but also a case of transformation from quantitative to qualitative change. The decrease in speed leads to movement being replaced either by the condition of being at rest or by movement in the opposite direction" (Bogdanov, 2016 [1923], p.184-185, italics in the original).

Thus, transformation is the underlying element in an otherwise continuously changing world. This is Bogdanov's monist argument against the duality of the empiriocritics. The mental and physical complexes – mind and matter – are causally linked through energy transformations. The conscious application of the collective forces of the proletariat against external nature consists "in the systematic and deliberate *transformation of forces* or, to be more scientific and exact, in the *transformation of energy*" (p.201, italics in the original). This is how "contemporary production 'changes the world'". Thus, Bogdanov acknowledged the centrality of the concept of energy for understanding a changing reality, to a large extent influenced by the Monist League of Ernst Haeckel (also a Machist) and Wilhelm Ostwald (Boll, 1981; Gare, 2000a). However, Bogdanov's use of the concept of energy to overcome the dualism between mind and matter does not lead to an argument in favor of energetic reductionism, as he overtly emphasized the social character of organizational processes related to mental and physical complexes. Energy was a crucial element to the continuity of natural processes, serving as an adequate means for assessing causal relations underlying these "transformations of forces". Social phenomena are an integral part of nature, what

does not preclude the possibility of emergent properties of purely social character – e.g. knowledge attainment – which require more complex levels of organizational forms. Whereas technology is the result of more primitive organizational levels of human activity, ideology relates to more complex ways in which cognition is employed to strengthen social bonds, such as laws, customs and concepts. Culture would be the combination of technology and ideology as forces driving the advancement of society (Gare, 2000a).

Bogdanov's "Marxist phenomenology" (Boll, 1981) led to a different approach to science, one that stresses and universalizes the epistemological importance of organizational aspects of natural and mental elements. It proposes a systematic method to reveal and generalize modes of organization, thereby exposing tendencies and regularities, able to predict future advancements of these modes of organization and to demonstrate their role in natural and mental processes alike (Bogdanov, 1996 [1913], p.85). Bogdanov's universal science of organization, Tektology, was part of the onset of the development of cybernetics, general systems theory and praxeology (Gare, 1994; 2000; 2000a)[28].

Tektology takes into consideration the prowess of self-organizing natural and social systems, a resistance or countertendency to the unescapable disorganizing principle imposed by the entropy law. If a system performs better against resistances in comparison to the sum of its isolated elements, it is deemed organized by Bogdanov. Organizational complexes are described in terms of their interdependencies, interlinkages, stability, plasticity and boundaries; tektological mechanisms act upon or regulate them through a selection process that determines which complexes will be preserved, transformed or destructed. In any case, change is always present, as preservation is seen as the outcome of balancing forces that constitute dynamic equilibria (Gare, 2000a).

[28] General systems theory would be present in the works of acclaimed modern ecological economists of the 1960s, such as Howard T. Odum (1924-2002) and Kenneth Boulding (1910–1993).

Bogdanov's philosophy was meant to be the foundation of a new culture and science. According to his post-capitalistic utopia, based on empiriomonism, the natural and social sciences would come together as a universal organizational science. In the long term, this new science would be capable to democratically foster the creation of a socialist society, a much more effective revolutionary endeavor toward the socialist ideal than seizing power overnight and maintaining a Taylorist production system, which would most likely lead to state capitalism. Informed by this new worldview, the proletariat would be able to organize themselves and economic production. To get rid of domination, it would be necessary to change the way in which production is organized. In turn, this would require a change in the organization of experience, destroying fetishisms and idols that reduce reality to the capitalistic organization of production and social relations. A different culture would emerge out of the conscious creation of new ways to organize experience, aided by the ideological labor provided by art, literature and philosophy. Once the cognitive barrier imposed on the proletariat by class society was lifted, this new socialist culture would allow for new ideas and actions, including the propensity of workers to "appreciate both the limitations and the significance of their environments and other forms of life" (Gare, 2000, p.346). Free from old fetishes and dualisms, they would be capable to acknowledge nature as comprised of self-organizing activities, and

> "to appreciate the intrinsic significance and diversity of these [self-organizing activities]. So while the past of human history is made sense of on the assumption that all knowledge is oriented towards controlling nature, society and individual experience for human purposes, and all past knowledge is interpreted in terms of such labour activity (i.e. instrumentally), humans will be able to appreciate that they are merely one form of organizing activity among others (i.e. realistically). Science itself will be comprehensible as a development within and of nature" (p.352).

The intrinsic value of nature asserted by Bogdanov was also present in his utopian novel *Red Star*, published in 1908. His predictions of future scientific and social developments entailed a genuine concern related to the natural limits of economic

growth[29]. Upon imminent environmental catastrophe, the advanced socialist Martian society debates about the possibility of conquering Earth and annihilating humans. The argument in favor of the significance of other forms of life – i.e. human life – are similar to Bogdanov's philosophical appreciation for the diversity and limitations of interdependent organizational complexes. The apparent rationalist-romantic stance of Bogdanov, thus, justifies the claim that "Bogdanov and those influenced by him, most importantly, Lunacharskii, had created an intellectual milieu within which those concerned about the environmental could flourish as never before" (Gare, 1994, p.90)[30].

Hence, in the context of the history of EET, Bogdanov can be seen as an ecological utopian, alongside Neurath, Ballod-Atlanticus and Popper-Lynkeus[31]. The foundational role given to the concept of energy and his opposition to the idea of endless abundance provided by human domination over nature led to a call for a new science and culture that turn individuals into active and creative historical beings, free from fetishist domination and aware of biophysical boundaries.

Bogdanov's views were fiercely opposed by Lenin, who could never let go of a certain level of conscious (i.e. party) control. He sided with Plekhanov in his orthodox interpretation of Marxist theory and condemned Bogdanov's proposal for a new culture and science (Lenin, n.d.). Other distinguished proponents of left-wing Marxism that participated in the conception of *Proletkult* and suffered attacks from Lenin were Pavel Solomonovich Yushkevich (1873-1945), Vladimir Aleksandrovich Bazarov (1874-1939), and Nikolai Valentinov (1879-1964) (Lenin, n.d., p.6). Lenin was also disappointed by how Bukharin, one of the leading

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[29] Bogdanov's preoccupations with an excessive economic development of advanced socialist societies, as portrayed in his *Red Star*, are left aside in the account of Kats (2004, p.305), who misleadingly states that "Bogdanov's quest for infinite creativity is conceptually connected with the Fichtean–Marxian quest for infinite [economic] growth".

[30] Gare (1994, p.66) goes beyond the importance of Bogdanov to the Soviet conservation movement to affirm that Bogdanov's ideas "confront the root causes of environmental destruction in the present, and offer what is perhaps the only way to overcome these causes".

[31] Not surprinsingly, Martinez-Alier (1987, p.214) discusses the influences of Popper-Lynkeus and Ballod-Atlanticus over Bogdanov. For more on Neurath, Popper-Lynkeus and Ballod-Atlanticus, see also Chapter 2.

theoreticians of Soviet Marxism, sympathized with systems theory and the notion of a social dynamic equilibrium. Bukharin supported *Proletkult*, for what he would eventually be labelled as a Machist revisionist by his enemies and be targeted as a menace by Stalin. Standing in the middle ground between Lenin and Bogdanov, he saw the need for some level of party control, while supporting the idea of shaping a new proletarian culture, of which the peasantry would be an important part. In the transition to a socialist society, cultural change would be a more important concept than class struggle; cultural hegemony more relevant than political hegemony (Sochor, 1988, p.218-221).

Bukharin also shared Bogdanov's view in relation to the dialectical relations between humans and nature, having dedicated a whole chapter to the question of the equilibrium between society and nature in his *Historical Materialism* (Bukharin, 1925). He attempted to couple ecological breakthroughs of the early 20$^{th}$ century with historical materialism, a challenge also faced by Sukachev, for whom the interconnections between natural phenomena were a premise of the materialistic dialectics of Marx and Engels. Not by coincidence, Sukachev had been influenced by Georgii Fedorovich Morozov (1867–1920), a Russian precursor of scientific forestry using systems theory and pioneer in the use of the concept of biocenosis in ecological science (Foster, 2015).

Going back to Lenin, it is worth asking why he supported Lunacharskii's *Narkompros* and, more specifically, the scientific advances of early Soviet ecology. Despite his more orthodox views on conscious control, Lenin did not agree with the more radical determinism of Plekhanov, which would later constitute a hallmark of orthodox Marxism. Lenin's dialectical materialism gradually assimilated the notion of spontaneity, in contrast to consciousness, which meant that the proletariat and the peasantry would spontaneously rebel against capitalistic social relations (Gare, 2002). Notwithstanding his political and philosophical controversies with Bogdanov, by 1919 Lenin would take the time to support an anti-mechanistic approach to the conservation of nature, a theme close to his heart that was entrusted to the respected intellectual figure of Lunacharskii.

If the philosophical foundations of early Soviet ecology were given by Bogdanov, Lunacharskii, Bogdanov's brother-in-law, was the main responsible for making

possible the progress of empirical studies on community ecology and for conveying their results and recommendations to government (Gare, 1994). As head of *Narkompros*, Lunacharskii provided the political support for the creation of the *zapovedniki*. He was a literary critic and art theoretician who envisaged a wide cultural transformation as key to the Soviet socialist ideal (Lunacharskii, 1918). His pluralistic approach to culture and emphasis on a humanistic education entailed the "progressives' goals of using science to develop the well-rounded, critically thinking individual" (Weiner, 2006, p.73). In an effort to attenuate the Leninist approach to conscious control, Lunacharskii drew elements from Goethean materialism and Hegelian dialectics to promote an intellectual background to the revolutionary movement based on an "aesthetic and ideological vision of freedom of action" (Medzhibovskaya, 2013, p.228). His Bolshevik-Marxist aesthetics managed to sustain a certain dose of revolutionary romanticism.

Lunacharskii's empiriocriticism was complemented by a philosophy of God-building (*bogostroitelstvo*), also practiced by the novelist Maksim Gorkii (1868–1936). Socialism would have the potential to act as a religion, inspiring individuals to prioritize collective goals and, thus, fulfill the fate of humanity (Mally, 1990, p.5).

> "Lunacharskii's main contribution to the radical Marxists was his (and Gorkii's) plan for a socialist religion of humanity to counter the arid atheism of Plekhanov's Marxism and the turn to "God-seeking" of former revolutionaries. Bringing religion down to earth, socialism should provide a sense of community, satisfy the yearning to transcend oneself and satisfy the quest for communion with the universe and the rest of humankind. The core of this vision was the celebration of human creativity and sociality and the quest to liberate these from oppressive and divisive social forms. This was the defining feature of the radical Marxists" (Gare, 2002, p.62).

The political efforts of Lunacharskii did not only enable the creation of the *zapovedniki*. The support of *Narkompros* was instrumental to the development of a new intellectual approach to the relations between man and nature, combining the empirical character of community ecology with a utopian worldview that, much alike that of Neurath, Ballod-Atlanticus, Popper-Lynkeus, Geddes, Hogben and Soddy, intended to transform reality without incurring in a totalitarian, technocratic agenda. It allowed the pioneering ideas of ecologists such as Vernadskii, Stanchinskii, Kozhevnikov, and Sukachev to thrive and build a legacy for posterity,

even if, by the late 1930s, the careers of most of them were cut short. Moreover, early Soviet ecology was composed of a particularly distinct community of thinkers bearing social energetics as a foundation and presenting an ecological utopian view toward issues such as resource distribution, social ideals and policy-making, which constitute the core of EET[32].

The next section describes in greater detail how social energetics played a central role in early Soviet ecology. Before that, it is worth stating that early Soviet ecology and the whole Soviet conservation movement of the 1920s became the epitome of *Proletkult*, probably the main reason why it fell prey to the enemies of the idealism of "Bogdanovism". As Gare (2002, p.71) succinctly and daringly states: "[t]he conservation movement was the ghost of authentic communism", meaning that left-wing Marxists

> "(…) wished to foster human creativity, not reduce people to instruments, and this way of thinking extended to the rest of nature. These Marxists, and Bogdanov in particular, appreciated that not only capitalism has immanent dynamics that are ultimately destructive of the conditions of its own existence. A bureaucratically organized society could also develop self-destructive dynamics. The only way to avoid such dynamics would be to create a society in which the division between organizers and organized had been overcome; that is, to create a genuinely democratic society. Under these conditions people would freely choose their futures. This would have been real communism. Whether this social form would have inspired and enabled people to develop their economies without destroying their environments is still an open question. It has not yet been tried" (p.72).

## 3.3 Energetics in early Soviet ecology

Having presented the intellectual milieu and political support that made possible the development of early Soviet ecology, the analysis is now shifted to the characterization of early Soviet ecology as a school of EET, and in which ways it stands out as a significant precursor of modern ecological economics. As defined in Chapter 2, EET assesses phenomena by means of the analysis of the flows and

[32] See Chapter 2.

stocks of energy and matter, drawing implications to the understanding of the processes of social provisioning and cultural development. Social energetics is deemed as a foundation of EET, while knowledge provided by such an approach might lead to a diverse assortment of worldviews regarding social provisioning processes and the arising moral and policy issues conducive to a determined social goal. According to early Soviet ecologists, such processes should be based on ecologically sound economic planning programmes, which will be discussed in detail in the next section. The following lines address the development of Soviet social energetics in the 1920s, understood as the study of the application of thermodynamic principles to social systems through the assessment of flows and stocks of energy that shape and condition the functioning of human societies.

As discussed in Chapter 2, Podolinskii's attempts in the early 1880s to couple Marxism with biophysical reality hinted toward an energy theory of value[33]. His views on economic theory and his measurements of energetic input-output ratios in agriculture constitute a landmark of a then emerging "school of ecological economics" (Martinez-Alier, 1987). By the 1920s, Bukharin (1925) would concur with Podolinskii in the sense that social reproduction could be analyzed in terms of energy exchanges, adding that multiple dynamic social equilibria could be ascertained by flows measured in energy units. At the same time, Gorkii, another *Proletkult* champion, promoted the notion of an energetic transmission between the natural world and human cognitive power, to a great extent inspired by Bogdanov's empiriomonism. To Petrov (2018, p.46), Gorkii's optimistic approach to reality would be "an ongoing meditation on the conditions of possibility of utopian thinking", meaning that energetics might provide a solid scientific base for the flourishing of a much needed ecological utopianism.

It was amid these debates that social energetics found its way into early Soviet ecology. Podolinskii's work was familiar at least to one of the most distinguished ecologists of the time, being mentioned by Vernadskii (1924). Although energetics

[33] The ecological economic thought of Podolinskii has been the subject of many Western historical works, such as Foster and Burkett (2004), Martinez-Alier (1987), and Martinez-Alier and Naredo (1982).

was already a concern among ecologists[34], its implications for social and particularly to economic systems would be an innovation quite characteristic of early Soviet ecology. However, as will be explained below, their achievements in this area do not fit exactly into the description of social energetics, as they did not apply thermodynamic principles to social systems, but limited themselves to the assessment of flows and stocks of energy in the biocenosis. Their originality consisted mostly in recommending that these results be used to inform economic planning programmes. Once the energetic accounting of a set of biological communities was attained, they hoped to be able to use this information to plan economic activity without disrupting the biocenosis. Economic planners would be responsible for adjusting the energetic demand of a given economy, translatable into biomass units, to the supply provided by the biocenosis.

Stanchinskii was at the forefront of research on “trophic dynamics” or “ecological energetics” (Weiner, 1988). He strived to describe how the flows of energy (and, analogously, of biomass) decreased along biological trophic levels, and how it conditioned the existence of a dynamic equilibrium in a determined community. The inter-species distribution of energy would serve as means to identify the boundaries of the biocenosis. Solar energy enters the biocenosis and is fixed by autotrophic plants, therefrom partially flowing to higher levels of the food web, until it is completely exhausted in the cyclical biological processes inherent to that community. The emerging dynamic equilibrium would correspond to the observed stability of the system, in which populational ratios between different species remained remarkably constant over long periods of time. Furthermore, the entropy law would dictate that energy must be dissipated while flowing along trophic levels, what could explain the gradually decreasing biomasses, from vegetation to herbivores, and finally to carnivores (Gare, 1993; 2002).

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[34] Developments on the transformations of solar energy in the biosphere were under way in Russia since 1884, when climatologist and geographer Aleksandr Ivanovich Voeikov (1842–1916) acknowledged the need for an energetic accounting of the solar heat received by Earth. Contemporary works with those of early Soviet ecologists were undertook by Sergei Ivanovich Savinov (1865–1942), Nikolai Nikolaevich Kalitin (1884–1949) and others, before studies on Earth’s heat balance would start to be more systematically pursued in the 1940s (Budyko, 1980).

The empirical approach to ecological energetics of Stanchinskii was based on a mathematical model that describes, in energy units, the dynamic equilibrium of a theoretical biocenosis. The annual energy budget of a given community was calculated using methods and tools[35] to measure the biomass of each component species (Stanchinskii, 1931, 1931b). His analysis of ecological trophic dynamics was highly original, preceding the work of Lindeman (1942) in ecosystem ecology by approximately a decade. To Weiner (1982, p.49), “Stanchinskii's approach to these problems represented a real revolution in the paradigm of the biocoenosis”, calling attention to how energetics might provide a common denominator, i.e. energy, to understanding inter-species transformations and interconnections in different biocenoses and in the biosphere as a whole.

His theory and methods were based on the assumption that biocenoses were comprised of continuous exchanges of matter and energy, as proposed by Bogdanov’s empiriomonism and Vernadskii’s notion of biogeochemical cycles. The biocenosis would be subject to a proper analysis by means of dialectical concepts that could explain the biological phenomenon of collective adaptation, a crucial research question to him (Stanchinskii & Kashkarov, 1931). Moreover, Stanchinskii earned his doctoral degree from Heidelberg University in 1906, what might hint toward some level of exposure to the influence of Ostwald’s energeticism. Thus, Stanchinskii’s innovative approach to community ecology can be regarded as a result of the amalgamation of Marxism, Bogdanovism, the energeticism of Ostwald, and Vernadskii’s breakthroughs in ecological science.

The economic implications drawn by Stanchinskii from his ecological energetics are closely related to his leading role in the political promotion of the creation of the *zapovedniki*. Although he never developed an empirical method to assess the economic demand for the energy or biomass of a biocenosis, Stanchinskii thought it would be possible to plan this demand according to what the biocenosis could offer, and in such a way that its stability would not be permanently ruined. Protected areas could serve as a standard or reference (*etalon*), whose detailed

[35] Stanchinskii made extensive use of equipment that allowed for sampling areas and capturing especimens, which he termed “biocenometers” (Stanchinskii, 1931).

ecological assessment could provide the necessary information for planning the use of natural resources of similar areas. The calculation of the productive capacity of a determined biocenosis would allow for the conception and execution of an ecologically sound economic planning programme. Thus, energetics, along with the bulk of the then ongoing research on the level of disturbance that biocenoses could tolerate without a major disruption, would foster a conservationism that was not diametrically opposed to the political urge to modernize and expand the Soviet economy, as endorsed by Lenin's New Economic Policy. The conservationism practiced by early Soviet ecologists did not prevent economic development, albeit it aimed, at the same time, to preserve large tracts of pristine nature. In the face of relentless political pressure for economic growth, they managed to find support through the discourse that preservation was essential for scientific progress and, consequently, to economic development itself[36].

## 3.4 Conservationism and economic planning

The development of conservationist ideas and their implications for economic policies unfolded while economic theory itself was going through radical changes. The Bolshevik political platform was based on the transformation of the current social and economic system, and economic analysis would be the means by which the revolution would reach its goals. Even if the Bolshevik ascension to power did not entail an immediate replacement of the economic system, the debate on economic ideas would extend from the period of War Communism well into the 1920s, during the deployment of the New Economic Policy. There were diverging views on how the emerging socialist regime should be economically organized, with a fair level of intellectual pluralism that would only cease with the purges under Stalin's rule. An important implication of Bolshevik control for economic theory was its transition from descriptive approaches to the economic system,

[36] Weiner (1988) uses the term "protective coloration" to explain how Soviet conservationists tried to adjust or soften their discourse in the face of the vilification and personal attacks promoted by the establishment against dissenters of official policy.

which used to inform specific state interventions for accelerating national development, into a thorough guide toward entirely new alternatives to the economic system and related policies, even if most of these alternatives were actually far from being implementable or implemented.

> "Various key themes came to dominate the immediate post-revolutionary period in relation to Bolshevik economics, for example the precise nature of socialised control of the productive forces, the role of non-monetary accounting in the planning process, the practicalities of monetary reform, and the importance of accommodating peasant economy in the construction of Russian socialism" (Barnett, 2005, p.95).

During the period of War Communism, the control of the productive forces by the state would, according to Lenin, emulate the managerial structure of capitalistic economies. At first, this professed negligence in terms of the need for conceiving a brand new socialist economic organization prevented the appearance of more comprehensive theoretical formulations on new economic structures. Conversely, they focused on the feasibility of non-monetary accounting and the adoption of a unit of exchange. As the 1920s unfolded, the difficulties involved in non-monetary accounting and control led to the reconsideration of monetary stability and the role of markets in a socialist economy, which would come into effect under the New Economic Policy.

Despite the Bolshevik emphasis on the social and economic possibilities of a state-run, collectively owned industrial sector, the accommodation of the peasant economy was the most important Soviet economic issue during the 1920s, receiving attention from the most prominent economists of the time, including Bukharin and Evgenii Alekseevich Preobrazhenskii (1886–1937). Feeding a growing population was a constant challenge, which spurred innovative contributions to agricultural economics. Barnett (2005) mentions at least four different currents of Soviet agricultural economics in the 1920s, which strongly disagreed on the economic advantages brought by modernizing agricultural entrepreneurs[37]. Nikolai Dimitrievich Kondratev (1892–1938) studied agricultural

[37] These discussions were at the center of agricultural policy-making until 1929, when it was decided to eliminate the *kulaks* (rich landowning peasants who employed wage labor) as a class.

markets and their impacts over farmers' decisions. The group led by Marxist agrarianist Lev Natanovich Kritsman (1890–1938) stressed the role of class structure in rural areas, taking into account the roles of wage labor and landowners. The organization-production school of Aleksandr Vasilevich Chaianov (1888–1937), Nikolai Pavlovich Makarov (1887–1980) and Aleksandr Nikolaevich Chelintsev (1874–1962) proposed a behavioral analysis of peasant farms, interpreted as households in which production was determined by the balance between consumption and the correspondent amount of toil. Right-wing agrarianist Lev Nikolaevich Litoshenko (1886–1943) opposed the organization-production school, arguing that, in a modern monetary economy, households composed by peasant farms would maximize the difference between earnings and expenditures, denying the labor-consumer balance suggested by Chaianov.

Barnett (2005, p.106) states that "[t]ogether with agriculture, planning was the other 'great theme' of the decade". Given the theoretical possibilities created by non-market forms of social control, Soviet economists pursued more original approaches to state planning, although facing the opposition of the pro-market views of Leonid Naumovich Iurovskii (1884–1938), the main voice behind the People's Commissariat of Finance (*Narkomfin*), who criticized non-monetary accounting and more comprehensive planning programmes[38]. Kondratev was also against more extensive planning programmes, arguing in favor of a moderate and flexible planning methodology in the face of the difficulties associated with the prediction of social activity. Notwithstanding his skeptical view on planning techniques, Kondratev left a significant contribution to the field, developing statistical and accounting methods that improved the state's capacity to measure agricultural production (Barnett, 1998).

Nevertheless, *Gosplan*, the State Planning Committee, opted for a comprehensive, imperative planning programme. The minds behind *Gosplan's* theoretical developments were left-wing Marxist Bazarov, Vladimir Gustavovich Groman (1874–1940) and Stanislav Gustavovich Strumilin (1877–1974), a pupil of

[38] Iurovskii's views would cost him his life during the purges of the 1930s.

Tugan-Baranovskii. The planning methods employed by *Gosplan* evolved during the 1920s, and, consequently, the committee managed to exercise a strong influence on the creation of the first Five-Year Plan, even if its implementation was often negatively affected by political and personal disagreements. Groman was the intellectual leader, having successfully proposed methods of numerical calculation of industrial production indicators, as well as of agricultural yields in the form of raw material balances (Barnett, 2005).

*Gosplan's* stance on planning benefited from the contribution given by statistician Pavel Ilich Popov (1872–1950), who proposed the notion of a national economic balance between supply and demand. He attempted to perform the statistical accounting of already existing economic flows from production to consumption, divided by types of goods and sectors of the economy. Although Groman criticized Popov's economic balance, on the grounds that it did not entail class division and allocation of manpower or of energy, it served as a starting point for determining production targets.

As the decade approached its end, the pluralism of economic ideas would be attacked and eliminated. Groman, Kondratev, Chaianov, Makarov, Chelintsev and others would no longer influence the conception of Soviet economic planning programmes. "In the late twenties, planning of the national economy implemented through compulsion replaced planning by methods which, with certain exceptions, would have been acceptable in democratic countries" (Jasny, 1954, p.54).

Therefore, the 1920s witnessed a surge in economic theory, especially in relation to the agricultural sector, non-monetary accounting and economic planning programmes. This was the setting in which early Soviet ecologists attempted to contribute to the specific, although highly controversial and relevant, issue of the planning of the agricultural or peasant economy. Either during War Communism or during the transition into the New Economic Policy, the political and economic conjuncture meant that environmental concerns would not become a state priority; supporting the creation of the *zapovedniki* was one thing, conditioning economic goals to ecological constraints was a whole different subject. Additionally, intense disputes in the academic scene between competing economic theories over policy-making forced the ecological economic approach to the fringes.

Bazarov was probably the closest link between early Soviet ecology and the group of economists actually working on economic planning institutions. He was a distinguished Machist revisionist who played an important role in the development of Soviet economic planning programmes during the 1920s. His economic research was based on the methods of the natural sciences, taking to heart the central role given by Bogdanov to the concept of equilibrium. However, Bazarov was not interested in environmental issues or ecological science. Although a follower of Bogdanov, his views on economic planning were much closer to the teleological and practical approach of Groman (Jasny, 1954).

At least from an intellectual point of view, Bazarov constitutes a missed opportunity for the progress of Soviet ecologically sound economic planning programmes at the time. Advancements on non-monetary accounting, economic balances and planning techniques could also have been used in this regard. Yet, despite all the political and academic barriers that prevented the implementation of an “ecological economic planning programme”, the recommendations of early Soviet ecologists on economic policy undoubtedly figured as extremely original.

### 3.4.1 Early Soviet ecologists as utopian economic planners

The economic policies recommended by early Soviet ecologists were mainly applicable to the planning of the agricultural sector. Animal and plant husbandry were the activities that most concerned community ecologists, given their potential to alter the biological stability of biocenoses. Environmental problems posed by the then incipient industrial sector were not yet fully recognizable, what would change after a couple decades, when the environmental havoc caused by industrial growth and large infrastructure projects would force ecologists to include geological and chemical processes in the characterization of a determined ecological unit[39].

[39] Vernadskii and Sukachev would spearhead the biospherical approach to ecology, what also meant that the term biocenosis would need to give way to biogeocenosis as the main concept among Soviet ecologists (Budyko, 1980).

The technical challenges faced by the agricultural sector were tackled by natural scientists working for the People's Commissariat for Agriculture, *Narkomzem*. On the other hand, this same institution tried to respond to political pressures to assess and improve land productivity, supporting the research of agricultural economists such as Kondratev, Makarov, Chaianov and Chelintsev. Early Soviet ecologists were mainly working for *Narkompros*, and a dispute ensued between these organizations over control of the *zapovedniki*. While *Narkompros* resisted, the reserves were protected and proved to be instrumental for the advancement of community ecology. The survey put together by Carpenter (1939) brings an extensive list of Soviet works on community ecology that produced very useful information and recommendations with implications for economic policy. It includes ecological methods to controlling the locust problem and other plagues, censitary data on species of the biocenosis, warnings on diminishing populations of plants and animals with economic value, and analyses on the productivity of forests, pastures, lakes and seas.

Thus, the role of community ecologists as economic planners started with their empirical research on the dynamic of the biocenoses of the *zapovedniki*, which they believed could lead to the formation of a body of knowledge capable of recommending ecologically appropriate economic uses. The *zapovedniki* would serve as standards of biological communities in natural harmony, resulting from hundreds of years of environmental adaptation; thus, comparative ecological studies could assess how disruptive was human-induced change, i.e. economic use, in analogous tracts of land. The *zapovedniki* could also be used in a comparative basis to the restoration of degraded areas. Ecological appropriateness meant the maintenance of the dynamic equilibria of the biocenoses, conditioned by the trophic energy flows within biological communities. There were limits to economic activity in each ecological unit, which could be empirically assessed. Disrespecting such limits would lead to the disruption of the biocenosis and, consequently, of the flows of natural resources necessary for economic activity.

Hence, early Soviet ecologists deemed conservation as a practice that favored the maintenance of the provisioning systems that, ultimately, enabled cultural

development. In this sense, it was a utilitarian, anthropocentric approach[40]. The romantic aspect stemmed from the acknowledgement that acclimatization cannot profoundly alter a biocenosis or artificially create a new one without jeopardizing the existence of human life. Man cannot surpass nature's ability to provide for him; he can only be inspired by nature to find ways to improve his life within limits imposed by nature. Plant and animal productivity can only be augmented within these limits.

In this sense, the rationalist-romantic worldview of early Soviet ecologists can be characterized as ecological utopian, combining natural science and moral imperatives related to resource distribution, social ideals and policy-making. Inspired by left-wing Marxists, particularly by Bogdanov's Tektology, early Soviet ecologists adopted a dialectical approach to the duality between man and nature, conceptualizing their integration. Ideally, man would live within boundaries given by nature. Although they did not consider humans a part of the biocenosis, always remaining rather an unnatural element, harmony between natural and social systems was obtainable. That is where their ecological utopianism lies. And, since the economic planning programmes proposed by them reflected this simultaneously rationalist and idealist approach, early Soviet ecologists can just as well be labelled as utopian economic planners.

The precautionary stance of early Soviet ecologists regarding the ecological limits of economic activity led to objections against the productivist bias of the first Five-Year Plan. They "called for a central role for ecology in formulating the Five-Year Plans" (Gare, 1994, p.91). Resource use and economic policy should be based on their scientific expertise, which "could ensure that growth would remain within the possibilities afforded by healthy nature" (Weiner, 1988, p.230). These claims gained momentum during the First All-Russian Congress for the Conservation of Nature, held in 1929, when ecologists realized that they needed to be part of the

[40] Nevertheless, the views of the neo-romantic conservationist current were also present among early Soviet ecologists. Kozhevnikov, for example, proposed an ethical and aesthetical approach to conservation, mentioning "the right of primitive nature to existence" (Kozhevnikov, 1960 [1909], p.90, author's translation).

formulation of the Five-Year Plans, with Stanchinskii arguing that “conservation organizations must be able to review plan targets and monitor plan fulfillment” (Gare, 1993, p.124). The ideas and recommendations put forth by Stanchinskii and other scholars, such as Vernadskii and Kashkarov, motivated by the apparent economic implications of community ecology, are representative of an ecological utopian alternative to more conventional economic planning programmes.

As mentioned in previous sections, the ecological energetics of Stanchinskii would serve as basis for the calculation of the productive capacity of each biocenosis. The results obtained would inform economic planners about the aggregated provisioning potential of a certain region and the ensuing economic possibilities. Several parameters or indicators pertaining biological activity and energy transformation could be created for that purpose, in addition to finding optimal conditions under which productivity can be maximized. To him, “such potentialities determine the role of organisms in nature and in the human economy” (Stanchinskii, 1931a, p.43, author’s translation[41]). For instance, when addressing the problem of the naturally low agricultural productivity of the steppes of southern Ukraine, Stanchinskii called for a thorough, multidisciplinary ecological study as the only path toward higher agricultural yields. To accomplish that goal, he proposed the use of the *zapovednik* of Askania-Nova as an *etalon*, based on which the productivity of crops in similar biocenoses could be improved (Stanchinskii, 1930).

Vernadskii reached similar conclusions pertaining the economic implications of ecology. However, he focused on biogeochemical cycles as the cornerstone of the neighboring field of biospherical ecology. Vernadskii concerned himself with social and economic applications of scientific progress, which became paramount after the devastation caused by the First World War. Although his contributions focused on the productive use of natural resources, the recognition of ecological limits to economic activity was also present. In 1915, he co-founded the Commission for

[41] All primary references in the Russian language appearing in any chapter of this volume have been freely translated by the author, unless a translated reference is used or is explicitly indicated otherwise.

the Study of Natural Productive Forces of the Academy of Sciences (*Komissiia po Izucheniiu Estestvennykh Proizvoditelnykh Sil pri Akademii Nauk*), which was in charge of supporting the development of the national economy by means of research on exploitable natural resources. This Commission and the State Commission for Electrification of Russia (*Gosudarstvennaia Komissiia po Elektrifikatsii Rossii*) would be the main institutions behind a renewed support for the growth of domestic industry, agriculture and trade, until their demise in the early 1930s (Chesnokov, 2013).

On the more specific issue of economic planning, Vernadskii expanded Stanchinskii's energy accounting of biological communities to biogeochemical processes, adding a geological component to produce an integrated assessment of how living matter appropriates available energy and, thus, shapes the biosphere (Ponomarev, 1989). He believed that the necessary planning of a socialist economy could be based on physical units[42], and energy would be such a common denominator for the economic appraisal of natural resources. Reducing natural productive forces to a single unit would be necessary to evaluate the potential of the environment to supply humans with their daily needs. Given the increasing demand for energy in modern economies, Vernadskii warned about the finite character of natural resources, especially mineral reserves, and called for more creative scientific breakthroughs to deal with the issue (Vernadskii, 1926; 1989 [1928]).

To Vernadskii (1988 [1921-1922]), it was Peter the Great who first tried to assess the vast, but limited, natural productive forces of Russia. However, not until the first quarter of the 20th century would more successful efforts be drawn in this respect. Russian natural wealth needed to be accounted for, understood, and properly put to use for the improvement of the living conditions of Russians.

> "A few years ago, in 1915, in the era of criminal war and slaughter, Russian society for the first time unexpectedly faced the need to

[42] Vernadskii's ecological utopianism is strikingly similar to Neurath's, as both have argued in favor of economic calculation in kind, egalitarianism in wealth distribution, and a unified science for the sake of the improvement of civilization (for more on Neurath, see Chapter 2).

> answer the question of what are the potential forces of the territory of Russia, to what extent they are used, how much can be used and what are the future opportunities. (…) These [studies] are the most productive and most necessary expenses, which now exist in the state organizations of mankind" (p.338).

Notwithstanding the theoretical underpinnings and the political and academic strength of Stanchinskii and Vernadskii, Kashkarov was probably the most representative figure among early Soviet ecologists addressing the question of economic planning. He was a professor at the Central Asian State University, in Tashkent, and later transferred to the Leningrad State University. He worked on comparative anatomy, zoopsychology, and zoogeography, before turning attention to ecology, being remembered as one of the most active advocates of community ecology. In the end of the 1930s[43], Kashkarov started to prepare a textbook entitled *Osnovy Ekologii Zhivotnykh* [Fundamentals of Animal Ecology], in which he dedicated a subsection to the practical importance of ecology to the construction of a socialist economy (Kashkarov, 1944, p.21-30). Back in 1933, Kashkarov had also coauthored an article with phytogeographer Evgenii Petrovich Korovin (1891–1963), whose aim was to point to the economic role and tasks of ecology in a planned economy (Kashkarov & Korovin, 1933). According to Terentev (2016 [1948], p.239), Kashkarov "increasingly sought to link his work with the needs of [human] life and social construction".

In the *Osnovy*, Kashkarov starts the subsection on the economic importance of ecology stating that the rapid development of ecological science is also due to the need for a rational and planned use of natural resources in a socialist economy. He embraces Bogdanov's Tektology, stating that only through an integrated, process-oriented worldview, aware of the complex interconnections between natural phenomena, would humans understand nature and put it to use for their own benefit.

> "In an era of intensive, rational and planned use of natural resources in our country, the importance of ecology grows

[43] Kashkarov was among the early Soviet ecologists who adapted their discourse according to the political atmosphere, reason why he managed to keep his academic positions until his death in 1941, during the siege of Leningrad.

> extremely. This is already clear from the rapid development of ecology in the USSR, which is closely connected with the main problems of the economy. Socialist construction poses problems that are completely new for us, and, moreover, on an entirely unusual scale in agriculture and animal husbandry, in fur and hunting, in fish farming, in silkworm breeding etc. Soviet practice and Soviet theory seek new methods for the accomplishment of their greatest tasks, and these efforts are permeated by a fundamental principle: we cannot solve any problem, we cannot master any phenomenon of nature, if we consider it in isolation, without their mutual connection and mediation. This principle compels us to study the natural complex with its intricate interconnections, that is, to study the ecological, to study not only the statics of phenomena occurring in a complex, but to study their dynamics, to study the process" (Kashkarov, 1944, p.21).

Kashkarov then tries to demonstrate how such an integrated approach can be applied to the different areas of the Soviet peasant economy. He cites fishing, agriculture, forestry, hunting, animal husbandry and even public health as sectors which would economically benefit from the application of ecological tenets, both in terms of expanding production and of rationally planning economic activities. His ecological economic thinking is clearly expressed when Kashkarov presents fishing as an important part of the economy, and how ecological research could improve the yield of fisheries without disrupting the respective biocenoses. There would be minimum requirements, in terms of resources, for the maintenance of the integrity of a given biocenosis; these requirements can be seen as fixed capital. Normally, only the accruing interest, a surplus provided by nature, can be appropriated by humans. The goal of community ecology would be to perform quantitative and qualitative assessments of such requirements and, thus, determine what can be drawn from nature. Therefore, ecological theories, methods, and accounting are essential to "a truly planned, scientifically grounded socialist economy" (p.22), which does not deplete the fixed capital from which society earns a profit.

> "We are reconstructing our fishing economy, applying new, more advanced, collective forms of fishing organization, better techniques, increasing fish production; we must find new fishing sites, expand fisheries to places where they did not exist before. However, we must do this in a way that does not violate the integrity of "fixed capital" - fish stocks; we should use only the "interest", according to a strictly developed plan based on accounting. Furthermore, we must increase the size of "fixed capital", increase the fish stocks in our fisheries, improve their quality, and repopulate exhausted commercial fishponds.

> Temporarily, due to necessity, it is possible to spend part of this "capital". However, this should be only temporary. It is impossible to solve these problems without using the methods of synecological study. Synecology should play an outstanding role in this regard. We can consider the pond, the river, the lake, the sea, as a complex, the components of which are in an intricate dependence on each other and on environmental factors" (p.21).

Kashkarov also points toward the importance of ecological research for the improvement of crop yields. In this respect, agricultural zoning would be a crucial point[44], which should also be analyzed in accordance with the precepts of ecology, and not solely as a consequence of demands authoritatively imposed by economic planners. Although "social and economic factors play a leading role in zoning, (…) it is quite obvious that one cannot give a culture to an area with conditions where this culture cannot flourish" (p.22). Natural and historical conditions would be determinant to the success of agricultural policies, which, to a large extent, impact the ability to forecast and plan economic activity.

Kashkarov highlights the important historical role of the domestic and foreign trade of fur, arguing that, after the "Great October Socialist Revolution", this activity was also a target of economic planning. The contribution of community ecology would entail the pursuit of "accurate data on the geographical distribution of fur-bearing and other commercial species" (p.27), as well as data on their habitat and density. To Kashkarov, quantitative accounting is "the basis of both planned economy and synecological study" (p.21). He called for a detailed ecological accounting of natural resources, which would serve as the basis for a dynamic, long-term economic plan. The example of the accounting of the pheasant for economic planning purposes is quite illustrative of his argument:

> "A planned economy is based on accounting. Harvesting furs, harvesting the leather of wild animals, harvesting game will only become planned in full sense when they are based on accounting.
>
> Pheasant in Central Asia is a highly important object of the hunting economy, an export item. The pheasant reserves, apparently, are great. However, no one can say how many pheasants there are in

[44] Other ways in which ecology might contribute to productivity, according to Kashkarov (1944), include biological methods of pest control, better animal husbandry techniques and progress in animal and human health.

> Central Asia. It must be taken into account, as without this it is impossible to draw up a procurement plan, an export plan.
>
> In order to make the right plan, not for one year, but a real economic plan, it is necessary to take into account the annual offspring, the number of young animals that survive under normal conditions, and the fluctuations of the survival rate, which depends on fluctuations in climatic and other factors. Only the ecologist can answer questions on the causes of periodic variations in population.
>
> At the present time, we are striving to forecast the "harvest" of game and poultry, i.e., its amount for some time ahead. For such forecasts, it is absolutely necessary to have a detailed knowledge of the ecology of the species we are interested in: its abundance at the present time, the state of its fodder base, its relation to meteorological factors, the influence of the latter on reproduction, the survival of juveniles etc." (p.27-28).

These ideas were already present in Kashkarov and Korovin (1933). Firstly, there is an emphasis on the application of science to economic development, which is absolutely necessary for a successful "socialist construction" (p.3). Soviet science, and community ecology in particular, would provide a dialectical understanding of nature, based on which theories could be formulated and proper methods applied to the attainment of social ideals. Science would need to move away "from a fruitless contemplative attitude towards nature" and become "a weapon necessary for the successful intervention of man in the phenomena of nature (…) to fulfill the plans of socialist construction". In this sense, ecology would be the most important discipline for the socialist construction, with immediate implications for the development of the national economy. Moreover, ecology could also determine the limits of environmental intervention, maintaining healthy and productive biocenoses by means of an ecologically rational economic plan. Although Kashkarov and Korovin acknowledge the progress of ecological science in Western countries, in the USSR the discipline would have more potential, given its centrality to a planned economy:

> "If we take (…) environmental journals of the West, along with very valuable articles, they clearly show a lack of purpose in most of the works. Such a position is understandable in countries where science, like the economy, is a matter of private initiative; the result is mostly personal interest. But we should not have this – ecology, like any other scientific discipline, must, first of all, serve life, the goals of a planned economic construction, solve the problems put forward by the latter" (p.4).

Secondly, there is the importance of accounting and planning. Kashkarov and Korovin explained how each sector of the peasant economy (agriculture, fishing, hunting, animal husbandry etc.) could be improved by the application of ecological accounting methods and the serious consideration of the results in economic planning. Any other way of economically approaching the issue of natural resources would not attentively consider environmental conditions, and, thus, would be imperfect, slower, and more expensive ways to explore these resources. The authors claim that an integrated assessment is necessary for a socialist planned economy, in which a reliable methodology should be employed to provide institutions with accurate data. Such a methodology should entail the dynamics of natural resources, without which a quantitative accounting would be unsatisfactory. Standing by the assertion that “socialism is, above all, accounting”, ecological work would also be legitimized by its quantitative character[45].

Once a thorough system of ecological accounting was in place, it would be possible to develop tailored planning solutions to each economic activity and, ultimately, to restructure these activities accordingly. However, before all of this could be done, community ecology had to be given proper support through the creation of the *zapovedniki*.

The political support given to early Soviet ecologists never really passed the ability to create the *zapovedniki*. However, their theories and recommendations were incredibly innovative, on their own and in comparison to contemporary developments in the West. Their ecological utopianism and the resulting economic planning programmes, although properly grounded on natural science, did not provide a ready-to-go, short-term policy for economic growth. What they offered was a permanent solution, in which man and nature would coevolve, balancing needs and limits. Their research was only beginning; many rounds of trial and error would be necessary before they could actually produce meaningful data and propositions.

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[45] Kashkarov’s attempts to match ecological science with the dominant political discourse, and, thereby, gain supporters for the creation, expansion and maintenance of the *zapovedniki*, explain the utilitarian tone and allusions to Marxism-Leninism as professed by the majority under Stalin.

Having failed to respond to immediate political demands, and being tagged as followers of left-wing Marxists, rationalist-romantic ecologists would eventually suffer the consequences. By the early 1930s, Stanchinskii and Kashkarov were already under attack by Lysenko[46]. With their chances of influencing economic policy falling from slim to none, they assumed their role as critics of Lysenko's policies, which meant Prometheanism at a whole new level, and the subsequent dismantling of the *zapovedniki* as they were.

> "The ecologists failed in their effort to gain a place in economic planning within the Soviet Union. They nevertheless became the most trenchant critics of the implementation of the Five-Year Plan. They opposed the damming of rivers without due care for the ecological effects; the collectivization and uniform mechanization of agriculture; the efforts to acclimatize exotic fauna; and interference in the life-styles of traditional societies occupying ecologically fragile environments" (Gare, 1993, p.124).

## 3.5 Early notions of natural capital and ecosystem services

The incursions of early Soviet ecologists into economic issues showcase a trailblazing interdisciplinary approach to understanding the relationship between man and nature. Their ecological utopianism combined groundbreaking research on community ecology with a conservationist ethos that translated into the idea that economic activity should be bounded by biophysical limits and planned so that natural processes are not irreversibly disrupted. Their intellectual accomplishments make it hard to deny them a prominent place in the history of EET.

A closer look into their views on what would be an ecologically sound economic planning programme reveals additional insights deemed relevant for ongoing

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[46] Vernadskii's situation was much different. A liberal and champion of free thought and science, he was never in good terms with the Bolsheviks. However, due to his almost mythical renown and prestige as one of the brightest Russian scientists, he managed to remain an active and independent researcher and thinker thoughout his life. Being one of the few former members of the old Imperial Academy of Sciences to return to Russia after the civil war, his academic cooperation with the Soviet government would "add legitimacy to the new regime and help to attract the old intelligentsia whose experience and expertise were desperately needed for Soviet reconstruction efforts" (Bailes, 1981, p.283).

academic debates among ecological and environmental economists. For example, the central role played by the concepts of biocenosis and natural productive forces in the discourses associated with socialist construction is quite telling. What did early Soviet ecologists mean when they applied these terms to the processes of social provisioning and the related formulation of economic policy? How do these terms respectively compare to the currently widespread concepts of ecosystem services and natural capital, in an economic sense? Answering these questions might help to better understand, in retrospection, the EET of early Soviet ecologists, as well as to put into perspective the present meaning of the latter two terms.

Åkerman (2003) investigated how the introduction of the concept of natural capital in the 1980s, acknowledged as a powerful metaphor, was appropriated by the discourses of different disciplinary traditions, each one aiming to consolidate a worldview or steer research priorities related to a growing demand for policies that would lead to sustainable development in a broad sense. The neoclassical interpretation of the concept, championed by Pearce (1988), would be of a “stock of natural assets serving economic functions” (Åkerman, 2003, p.434). Although Pearce’s objective was to increase environmental concern among mainstream economists, fostering new theories and methods that truly account for nature’s particularities, the term natural capital legitimized nature as an abstract economic category, paving the way to narrow monetary valuations of the environment.

Within ecological economics, the term has been intensively debated and disputed in the last thirty years, although a more common view of natural capital would refer to the set of ecosystemic elements that allow for the flows of energy and matter, which enable social provisioning processes by means of ecosystem services and availability of natural resources (e.g. Costanza, 1991). Natural capital would be more accurately characterized in a relationship of complementarity – as opposed to substitutability – to other types of capital. This assumption would imply that there is a biophysical limit to economic activity, based on the scientifically proven need to maintain these ecosystemic elements at a minimum level, so as not to disrupt the biogeochemical cycles and processes involved. However, ecological economists themselves still do not agree on the policy implications of such a view

of natural capital, with the use of monetary valuation and cost-benefit analysis being a key point of dissent among them. Even so, Åkerman (2003, p.439) distinguishes and counters two main approaches to the meaning of natural capital: the "financial asset" and "ecosystem" interpretations, respectively of neoclassical and ecological economists.

Missemer (2018) performed a meticulous search of the concept of natural capital in the history of economic ideas, going back as far as the 18th century. His research aimed to find appearances of the expression "natural capital" whose meaning corresponded to either the "financial asset" or "ecosystem" version of the concept. His findings suggest that the first author to use the term bearing a similar meaning as intended by Pearce – as a set of productive environmental assets – was Alvin S. Johnson (1874–1971), an American economist working in the beginning of the 20th century. Hence, he would have been a precursor of the "financial asset" approach to the concept of natural capital.

Analogously, it could be argued, based on the results of the previous sections, that early Soviet ecologists were precursors of the "ecosystem" approach to the concept of natural capital, mirroring Johnson's stance in relation to the "financial asset" perspective. Although the term does not explicitly appear in the appraised works of Stanchinskii, Kashkarov or Vernadskii, an assessment of the context, content and intent of their work reveals the use of notions that are strikingly similar to the modern use of the concept of natural capital as a set of ecosystemic elements. However, there is no evidence and odds are that the modern use of the term bears no causal relationship to the intellectual developments of early Soviet ecology.

The expression of choice of Vernadskii (1926; 1988 [1921-1922]) was "natural productive forces". It does not constitute an extension of the Marxist labor-centered notion of productive forces, which was used by Bukharin (1925) to discuss the dependence of man on nature. Citing Marx's Capital, Bukharin explained – not without adding his views on social energetics[47] – that "nature's

[47] See Chapter 2.

material" (Marx's words), such as soil, would provide the means of subsistence that exists independently from man and are the subject of human labor. Nature would be "the immediate object of labor in the acquisitive industries" (p.105).

Unlike Bukharin, Vernadskii was against the philosophical dominance of dialectical materialism in Soviet science, defining himself as a philosophical skeptic. For him, the practical implications of scientific knowledge were the best hope for humanity, and the civilizatory process would be determined by "peaceful evolutionary change" (Bailes, 1981, p.290). Such a process would be conditioned and enabled by "natural productive forces", as discussed in the previous section. Labor is absent from this formulation:

> "The wealth of a country or a people can be decomposed into two interrelated, but largely independent, parts: 1) the forces of nature of the territory which is at the disposal of the country, and 2) the forces of the people who occupy this territory" (Vernadskii, 1988 [1921-1922], p.337).

Vernadskii's natural productive forces included the biogeochemical elements of ecosystems, namely "underground wealth, the wealth of soils, the products of the animal and plant kingdoms, and the sources of mechanical energy". Such elements needed to be scientifically explored, their economic value understood and "translated into forms that are accessible to human life" (p.337-338).

Kashkarov (1945), on the other hand, used the term "capital" in a very specific context, giving a small margin of error for the statement that he anticipated the "ecosystem" approach of ecological economists to the modern concept of natural capital. His passage on fisheries explicits his view of ecosystemic elements (fish stocks, a pond, river, lake or sea) as "fixed capital" (p.21). The integrity of such a "fixed capital" must not be violated, hinting toward the need for limits to the employment of such capital and its monetary valuation, as well as the precariousness of its substitutability for labor or man-made capital. The "interest" accruing from this "fixed capital" would ideally constitute a limit to the human use of natural resources and ecosystem services. Whereas Johnson did not include ecosystem services in his definition of natural capital (Missemer, 2018), Kashkarov certainly did, although using the terminology proper to biocenology.

The concept of biocenosis – and, later, of biogeocenosis[48] – was embraced by most Soviet ecologists of the 1920s as the basic unit of nature. It corresponded to a holistic view of nature, in which living and non-living elements would be interdependent and tending towards a relative equilibrium. In this respect, as warned by Kozhevnikov, humans would be a part of the biocenosis, with the power to alter natural processes (Weiner, 1984). Neo-romantics and rationalist romantics shared this holistic approach, despite their different arguments and methods, inferring an indivisibility between man and nature which would have vital implications for their vision of culture, social organization and economic planning.

The holistic view of nature, on which biocenology is firmly grounded, implies that natural resources are not independent elements that can be analytically separated and withdrawn from the whole without unintended consequences. To Kashkarov (1944, p.215), the practical importance of the concept of biocenosis lies in the fact that human intervention needs to acknowledge the dependency among the elements of a given ecological unit. “[E]ven if we are interested in a separate species of a natural complex, we are always confronted with the biocenosis, and often our inattention to the latter is fraught with undesirable consequences”. Vernadskii shared this vision and expanded it, including the mineral realm into his understanding of a natural complex and proposing that the same interdependency among ecological elements is valid on a planetary level – the biosphere.

This view is not only in synch with the concept of ecosystem, but also with the economic notion of ecosystem services, which allude to the importance of the interconnections between different biogeochemical processes and the need for a holistic approach to understand their functioning. The term ecosystem, as proposed by George Alfred Tansley (1871–1955) in 1935, refers to “a holistic and integrative ecological concept that combine[s] living organisms and the physical

[48] Sukachev defined biogeocenosis as “a combination on a specific area of the earth’s surface of homogeneous natural phenomena (atmosphere, mineral strata, vegetable, animal, and microbiotic life, soil, and water conditions), possessing its own specific type of interaction of these components and a definite type of interchange of their matter and energy among themselves and with other natural phenomena, and representing an internally-contradictory dialectical unity, being in constant movement and development” (Sukachev & Dylis, 1968, p.26). Biogeocenosis is a close variant of the now more usual term ecosystem, a key concept in ecological economics.

environment into a system" (Golley, 1993, p.8). Major (1969, p.15) compares the concepts of ecosystem and biogeocenosis, arguing that, although the former is based on functions within the system and the latter more focused on descriptive relationships, both entail "the transformations and exchanges of matter and energy. (…) The biological concept common to both ecosystem and biogeocoenose [or biogeocenosis] is the important point".

The economic notion of ecosystem services, at least since the 1970s, refers to the "utilitarian framing of beneficial ecosystem functions as services (…) as a way to communicate societal dependence on ecological life support systems" (Gomez-Baggethun et al., 2010, p.1209). As shown for the concept of natural capital, which Åkerman (2003) divided into the "ecosystem" and "financial asset" approaches, the economic concept of ecosystem services, according to Gómez-Baggethun et al. (2010), also saw two different interpretations of its meaning in the 1980s: on the one hand, as use values in Classical economics, associated with nature's benefits; on the other hand, as exchange values in neoclassical economics, which is responsible for the mainstreaming of this concept in the 1990s and the accompanying trend of monetization and commodification of nature.

Kashkarov (1944), when discussing the ecological accounting of the pheasant, clearly links its economic use values – as inputs to a planned economy – to the role of climatic and other factors. These factors cannot be considered "in isolation, without their mutual connection and mediation", which leads to the need to "study not only the statics of phenomena occurring in a complex, but to study their dynamics, to study the process" (p.21) – i.e. to study ecosystem functions as services that yield well-being to humans.

Throughout the work of early Soviet ecologists, there is an explicit appreciation for the role that ecosystems play to the maintenance and improvement of the human condition, including material provisioning and the satisfaction of aesthetic or cultural needs (Kozhevnikov, 1960 [1909]). This is an appreciation of ecosystem services. However, instead of trying to assign monetary exchange value to an ecosystem and its services as "financial assets", as common practice since the 1990s, they tried to conceive planning programmes based on use values, and how society could enjoy such capital and services without incurring in ruptures in the

ecological balance of these ecosystems. They tried to assess the limits within which society could be provided for, and so plan economic activity accordingly. Their view of the role of ecosystems to social provisioning and cultural development can, therefore, be regarded as an early attempt to address the importance of ecosystem services and how to conserve them, while making use of them as sources of livelihood.

## 3.6 Russian roots of early Soviet ecology: the *narodnik* intelligentsia

The anti-mechanistic science of early Soviet ecologists was based on left-Marxism, and on Bogdanovism in particular. These philosophical views were themselves inspired by the tradition of Schelling and von Humboldt. In a broader sense (i.e. including the nihilist, neo-romantic conservationist and rationalist romantic currents), the influence of Western thought over Soviet ecology spanned from German idealism and realism to French and English utilitarianism. There were also influences on the individual level, as that of von Humboldt on Semenov-Tian-Shanskii, of Conwentz on Borodin and Kozhevnikov, of Ostwald on Stanchinskii, and of Ballod-Atlanticus on Bogdanov. Shtilmark (2003, p.16), somewhat neglecting the intellectual developments within Russia that might have contributed to the appearance of early Soviet ecology, states that

> "[i]n the early 20th century, development of the Russian *zapovednik* system was stimulated by an active European movement for the preservation of monuments of nature. (…) Another influence was the existence of the USA national-park system, which served as a kind of model and, so to speak, a 'reproach' to the Russian nature-protection community".

By the 1920s, Russian EET was in fact a mixture of Western and Slavic traditions. While German idealism was an important philosophical reference to early Soviet ecologists, their rationalist-romantic approach was also "conditioned by the traditional Russian value of community feeling" (Weiner, 1988, p.12), and by "rich [Russian] practical traditions in agronomy, forestry and meadow management" (Gare, 2002, p.58). Prior Russian knowledge on the environment was traditionally tied to the organization of the peasant commune, or *obshchina*, which serves as the main connection between the ideas of early Soviet ecologists and of the *narodnik* intelligentsia of the 19th century. The subsistence of the peasants and

their reluctance to adopt an economic organization based on free markets and surplus production – which would later contribute to a significant level of environmental destruction in the steppes – were issues intimately related to the call of early Soviet ecologists for the preservation of the equilibrium between society and nature, to be made possible by ecologically sound economic planning programmes.

19th-century narodnism was a widespread intellectual movement in Russia, and its legacy is far-reaching. In the context of the appearance and development of Soviet ecological science in the 1920s, nihilists drew their ideas not always directly from the French and English, but also from the reinterpretations provided by *narodnik* thinkers, such as Herzen and Chernyshevskii, as already mentioned. On the other hand, neo-romantic conservationists had former ties with members of the Petrashevskii Circle during the 1840s, who promoted the role of the *obshchina* as the main pillar of Russian traditional social organization. The *narodnik* intelligentsia saw the peasant commune not only as a formidable social organization, but as a structure through which man related more directly to nature, seeking its subsistence, before intense industrialization and urbanization processes dramatically changed the situation.

There are several different instances that hint toward a strong connection between early Soviet ecology and narodnism. Social energetics is an important uniting element. The quantitative works of *narodnik* revolutionary T. M. Mikhailov (1859–1881) (and similar works of M. P. Shebalin, S. S. Zlatopolskii and F. G. Liubimov) tried to analyze the subsistence of the peasants in energy units (Tvardovskaia, 1978, p.66). These attempts indicate that Podolinskii's work on social energetics was not an isolated initiative. In fact, Martinez-Alier (1987) argues that Podolinskii was himself a *narodnik*, having taken part in revolutionary movements in Ukraine and Russia against the tsar and in favor of the peasant commune.

Gare (2000) contends that Bogdanov was originally a *narodnik*, never fully renouncing his early anarchist ideas and reinforcing the primacy of social praxis. Kelly (1981, p.89) corroborates this point, to whom narodnism shared the basic philosophical elements of empiriocriticism: "the attainment of an integral view of the world, centred on the ideal of an integral personality". The *narodnik*

intelligentsia was, according to Kelly, “strongly influenced by the romantic and idealist vision of the harmonious, integral personality which would succeed the divided men of the present”. This alleged link between narodnism and empiriocriticism demonstrates the extent to which *narodnik* thinkers contributed, through Bogdanovism, to the intellectual development of early Soviet ecology.

The holistic approach to the study of a determined location, embodied in the concept of *kraevedenie* (the equivalent of the modern notion of regional studies), with all its living and non-living elements, constitutes another shared trait between these two intellectual movements. *Kraevedenie* was developed during the existence of the *zemstvos*, which were local administration bodies created in 1864 as part of the reformist policies of the tsar Alexander II. Their aim was to integrate the peasants into the life of the modern Russian State and to improve their agricultural productivity. These institutions were, however, mostly composed by members of the liberal nobility and *narodnik* intelligentsia, who would eventually support the permanence of the *obshchina*. The *zemstvos* were abolished after the assassination of Alexander II in 1881, deemed as strongholes of anti-tsar radicals by the newly crowned Alexander III. Conversely, the concept of *kraevedenie* and its practice would become more popular during the 20th century (Johnson, 2006), especially in the Soviet era, figuring among the intellectual interests of early Soviet ecologists such as Stanchinskii (1923; 1923a)[49].

Thus, the *narodnik* intelligentsia was, to a great extent, a Russian root of early Soviet ecology[50]. Moreover, the above-mentioned characteristics of narodnism make it hard to deny that it is on its own an important movement in the history of EET. There is a yet unexplored intellectual thread that could confer even more legitimacy to both claims: the ecological utopianism of the *narodnik* intelligentsia,

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[49] Another relevant figure in this respect was Zhitkov, a pro-acclimatization, nihilist ecologist who served as deputy president of the Central Bureau for Kraevedenie in the 1920s (Weiner, 1988).

[50] The organization-production school of agricultural economics, best represented by Chaianov, also has its origins traced back to narodnism, being dubbed a “neonarodniki faction” (Jasny, 1954, p.52). The connection between Chaianov and early Soviet ecologists is less clear, although the former, as was shown here for the latter, made use of scientific utopian thought in the context of the peasant economy (Raskov, 2014).

regarded as the combination of knowledge stemming from the natural sciences and morally determined social ideals as the drivers of revolutionary movements and other forms of shaping social reality. Ecological utopianism in *narodnik* thought will be presented in the next chapter.

# 4 ECOLOGICAL UTOPIANISM IN *NARODNIK* THOUGHT: CHERNYSHEVSKII AND THE REDEMPTION OF LAND

The revolutionary socialist movements seen in Russia in the 19th century, especially since the 1860s, are often loosely referred to as a single political and intellectual group of opposition to the Tsarist regime called the Russian populists[51] or *narodniki*. The emancipation of the serfs in 1861 and other reforms promoted by Tsar Alexander II marked the downfall of feudalism in Russia, being replaced by a new system that, according to the *narodniki*, encouraged the exploitation of peasants by landlords and threatened the existence of the traditional system of rural communes (the *obshchina*), which reflected the true essence and will of Russian peasants.

Narodnism was, however, composed of several different ideological currents along the second half of the 19th century. This statement can be inferred by the observed multiplicity of revolutionary inclinations, such as the anarchists, nihilists and social revolutionaries; of formalized and often antagonistic groups such as "*Zemlia i Volia*" ("Land and Liberty"), "*Narodnaia Volia*" ("People's Will") or "*Chernyi Peredel*" ("Black Repartition"); and of geographical differences, as northern and southern movements within the imperial Russian territory differed significantly. Each current displayed a specific set of visions and strategies for action, inspired by the ideas and ideals of thinkers acknowledged as representatives of the so-called intelligentsia, which would define its perspective on matters such as the state, Marxism, the peasants, and the intelligentsia itself.

All of these currents were, to some extent, inspired by the works of either Herzen, Chernyshevskii or Nikolai Konstantinovich Mikhailovskii (1842-1904), although a (non-exhaustive) list of prominent *narodnik* intellectuals working in Russia or

[51] The term populism comes here as a free translation from the Russian word referring to the ideology of *narodnichestvo*, stemming from "*narod*" – people or folk. The term "narodnism" is widely used with the same specific meaning and is here given preference, given the multiple uses of the word "populism".

abroad – and publishing in legal and illegal periodicals[52] – would include names such as Vissarion Belinskii (1811-1848), Nikolai Nekrasov (1821-1878), Pyotr Lavrov (1823-1900), Nikolai Dobroliubov (1836-1861), Dmitrii Pisarev (1840-1868), Petr Tkachev (1844-1886), Nikolai Danielson (1844-1918), Vasilii Vorontsov (1847-1918), Vera Zasulich (1849-1919), Aleksandr Mikhailov (1855-1884), Lev Deich (1855-1941), and Nikolai Rusanov (1859-1939). The literary works of renowned Russian novelists also stirred these revolutionary movements in some sense, as in the case of Dostoevskii, Turgenev and Tolstoi (Berlin, 1994 [1978]).

Herzen was one of the earliest intellectual supporters of the *narodnik* movement. He stood for the ideal of a small-scale communal living, with the protection of individual liberty by a non-interventionist government. His work strongly influenced Chernyshevskii's writings, who saw class struggle as the main form of social development and argued in favor of the interests of the working people. His social novel "*What is to be done?"* (Chernyshevskii, 1989 [1863]) was one of the most famous literary works in Russia during the 1860s, in which featured the character of Rakhmetov, the epitome of the "true" Russian revolutionary: selfless, pragmatic, and ascetically committed to the cause.

Mikhailovskii's main intellectual contribution concerned the individual in the historical process, whose individuality would be formed by interactions with the environment – a struggle for individuality that contrasted with Darwin's struggle for survival. In works such as "*What is Progress?"*, "*What is Happiness?"* and "*Heroes and Crowd"*, Mikhailovskii addressed the complexity of individuals and their inclination to cooperation (the "solidarity principle"). Drawing on individual development, he saw social progress as the harmonious cooperation among equals with similar interests and functions. More complex levels of cooperation would lead to division of labor, with solidarity eventually being replaced by

[52] Examples of such journals are Otechestvennye Zapiski, Sovremennik, Kolokol, Zemlia i Volia!, Vperied, Nabat, Narodnaia Volia, Rabochaia Gazeta, Chernyi Peredel, Zerno, Russkoe Bogatstvo, Vestnik Narodnoi Voli, Listok Zemli i Voli, Polyarnaya Zvezda, Nedelia and Severny Vestnik.

competition. In this case, society would reach a higher stage of development, but with undesired organizational consequences. Russia would not be as developed as Western Europe, but would possess a better form of social organization, which corresponds to a more adequate measurement of “genuine improvement”, as exemplified by the *obshchina*. Western countries would display a social pathology, with high costs to human evolution at the individual level to the point of the suppression of individuality.

The revolutionary vein of the Russian intelligentsia was already present in the Decembrist insurrection, when, in 1825, liberal military and aristocrats challenged the Tsarist establishment. Among such “gentry revolutionaries”, as dubbed by Walicki (1979, p.53), there was Pavel Ivanovich Pestel (1793-1826), who argued that public ownership over a substantial part of the Russian land would ensure the livelihood of Russians. Rural communities should be allowed to function freely, self-governed by means of local councils (the *mir*). Such an emphasis on the social and economic significance of the village commune for the future of Russia would make Pestel one of the precursors of a long line of thinkers that gave the idealization of the *obshchina* “an astonishing career in the history of Russian ideas” (Walicki, 1979, p.63).

The defeat of the Decembrists and the tighter rule of Nicolau I were followed by a turn of the intelligentsia away from Western Enlightenment and toward romantic literature and, particularly, toward German idealism. Venturi (1960) traces the origins of narodnism to the 1830s, when such a renewed philosophical view took to heart the emergence of the peasant problem and associated socialist ideas. In the 1830s, Petr Yakovlevich Chaadaev (1794–1856) was one of the first voices to propound the idea that Russia, lagging behind Western Europe in terms of economic development, would be in a privileged position to avoid its errors – namely an excessive industrialism, utilitarianism, and rationalism – and fulfill its fate as a beacon of hope for the future. This was the context in which the intelligentsia saw itself divided into two main groups of thought shaping the theories underlying the burgeoning revolutionary movements: the Slavophiles and Westernizers.

The Slavophiles (e.g. Chernyshevskii and Dostoevskii) drew from German romanticism the view in which Western social and political systems were decadent and harmfully leading to rampant competition and conflict, what stirred a search for traditional Russian values. Integral personalities and harmonious communities would need faith and unity to thrive. In Russia, these aspects translated into the central role of religious orthodoxy and trustworthy authority, the latter regulated by the doctrine of *sobornost*, i.e. a cooperative or conciliatory imperative against individualistic drives for the sake of reaching common ground. Advocates of the Slavophile movement, such as Ivan Vasilevich Kireevskii (1806–1856) and Aleksei Stepanovich Khomiakov (1804–1860), claimed that these were the prevalent norms throughout Russia before Peter the Great initiated modernizing reforms to conform to Western worldviews. To Walicki (1979), Slavophilism was conservative and utopian, imbued with a vision of social ideal that, even if naively nostalgic, presented positive elements that combined into an alternative to Western liberalism. The *obshchina* would be one of these elements, believed to be at once the guardian of true Russian values, the seed of a utopian future, and the last resource of the Russian people against its turn into a starving proletarian mass.

The Westernizers (e.g. Belinskii, Herzen, and Tolstoi) shared the utopian socialist views of the Slavophiles, as well as the praise of the *obshchina*. However, they drew different implications from the German idealism of Schelling and, later, of Hegel. Westernism (*zapadnichestvo*) sought to implement in Russia certain liberal principles of the West in detriment of orthodox faith and authority as social pillars, even if some of the features of Western social systems, such as capitalistic individualism, were to be rejected. Belinskii flirted with the possibility of allowing for more market-driven economic development in Russia; Herzen, in turn, was against it. In any case, both so-called “Russian Hegelians” (Walicki, 1979, p.115) praised Peter the Great for beginning a process in which some of the backward characteristics of Russian society would be challenged through reason, combining German philosophy and French political activism.

In the 1840s, the anti-tsarist and anti-serfdom Petrashevskii Circle associated the *obshchina* with Fourierist communities and with the future implementation of socialism. Their ideas were further developed by Herzen in the 1850s, who

believed the role of the intelligentsia would be to develop the notion of integral personality among the peasantry, and add it to the traditional cooperative and collective values they already possessed as members of the *obshchina*. The 1860s saw the rise of the influence of Chernyshevskii, Dobroliubov, and Pisarev, but, by the 1870s, it would be the ideas of Herzen, Chernyshevskii, and Mikhailovskii which dominated the debates on whether the development of capitalism in Russia could and should be interrupted.

Toward the end of the 19th century, the clash between narodnism and Marxism within the intelligentsia took center stage. Tvardovskaia (1978 [1969]) affirms that there were two different approaches to narodnism within Russian Marxist tradition[53]: the more fierce opposition of Plekhanov[54] (after his turn against the movement), who urged the *narodniki* to give in to the internal logic of Marxist theory and attacked their alleged backward views and absurd reform propositions; and the more reasonable stance of Lenin, who delved deeper into the question of the revolutionary movements as a legitimate initiative, arising from a specific social class and having the historical right to existence in reformist Russia. After twenty years of criticism toward *narodnik* idealism and subjectivism, Lenin would himself reject a more elementary materialism and adopt a broader view on human knowledge, recognizing narodnism as a necessary process in the evolution of social ideas, despite its faults and failures[55].

The expansion of Marxist thought in Western Europe has contributed to weaken Russian utopian socialism[56] and turn many revolutionaries into Marxism.

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[53] The points of view of Marx and Engels themselves toward narodnism (and particularly toward Chernyshevskii's ideas) are important, but remain out of the scope of this text. A comprehensive collection of their writings on revolutionary Russia has been organized by Marinicheva et al. (1967).

[54] Plekhanov, Deitch, Zasulich and others in exile in Geneva cofounded the revolutionary group *Osvobozhdenie Truda* ("Emancipation of Labor"), considered by many the first Russian Marxist organization (Plekhanov et al., 1883).

[55] Lenin criticized the *narodniki* on their internal political clashes. A heated debate on the issue took place between 1893 and 1899.

[56] Russian utopian socialism was not restricted to narodnism, having also been developed by the collectivist anarchism of Mikhail Bakunin (1814-1876), which aimed to organize the peasantry for

Nonetheless, as Tvardovskaia points out, the apparent loss of narodnism to proletarian socialism has not meant its disappearance, and its role in inspiring millions of peasants in 1905 in their struggle for a Russian democracy cannot be denied. In fact, as asserted by Offord (1986), the rise of social-democrats in the 1890s was not exactly a resounding loss for the *narodniki*, as both currents pursued emancipation from the rule of the Tsar and the practice of some form of egalitarianism. Also, to Walicki (1979), the *narodnik* conviction that Russia did not have to abide by Western ideologies prevailed, constituting an important legacy for future generations of Russian revolutionaries.

Despite all the particularities of the different groups and inclinations, Hamburg (2010, p.47) refers to a "classical intelligentsia", defined as thinkers who "adopted a more-or-less systematically critical attitude towards some aspect of the existing order". Among them would be the radical *intelligentsy* (which included not only the *narodniki*, but also radical Westernizers, nihilists, and social-democrats), who saw no other way but to overthrow the regime. Karaömerlioglu (1996) explicitly advocates for a view of narodnism as a part of the European socialist intellectual tradition understood in terms of the confrontation between the intelligentsia and the state.

In this context, Palmieri (1918-1919, p.477) tries to unveil the following question posed by Herzen: "why is Russia a revolutionary land?" The author claims that "the genesis of Russian revolution is lack of a historical past". Russians would be more bound to the future than to any "ancestral fetish". A real chance for a new, civilized life, never been bestowed upon its people before, would justify Russia's rupture with the past. This means that the peasants, whose revolts have been recurring since the 17$^{th}$ century, would be ready to forfeit all its inheritances in order not to starve for the first time in its history.

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revolutionary purposes. The particular relationship between narodnism and anarchism is thoroughly discussed by Gamblin (1999).

The centrality of the peasant question in narodnism was well summarized by Berlin (1994 [1978]), according to whom the unicity of purpose of narodnism was given by its utopian views on the peasantry as a class:

> "What were the ends of populism? Violent disputes took place about means and methods, about timing, but not about ultimate purposes. Anarchism, equality, a full life for all, these were universally accepted. It is as if the entire movement – the motley variety of revolutionary types which Franco Venturi describes in his book [Venturi, 1960] so well and so lovingly – Jacobins and moderates, terrorists and educators, Lavrovists and Bakuninists, 'troglodytes', 'recalcitrants', 'country folk', members of 'Land and Liberty' [*Zemlia i Volia*] and of 'The People's Will' [*Narodnaia Volia*], were all dominated by a single myth: that once the monster was slain, the sleeping princess – the Russian peasantry – would awaken without further ado and live happily for ever after" (p.235).

The importance given to the *obshchina* by the *narodnik* would also carry environmental implications. Josephson et al. (2013, pp.38-49) discuss the relations between peasant agriculture and environmental change in late imperial Russia, contending that "the peasant commune had perhaps the greatest human influence on the environment before the industrial revolution and the rise of the city in Russia". The complex social changes in peasants' attitudes towards agricultural science[57] and the impacts of the communal system on land productivity were key elements in the analyses of the *narodnik* intelligentsia. The authors also claim that "peasants accumulated considerable knowledge over time, and that their techniques became damaging only under pressure of population increase or when they tried to introduce them in different environments".

The "conquering of the steppe" (set forth since Ivan the Terrible in the 16th century), aiming to control and populate a vast expansion of land at the frontiers of the Russian empire through agriculture in grasslands, meant a profound change from earlier days in which peasants would live in the forest-heartland, seeking subsistence from cereal and animal farming. By the late 19th century, although peasants made use of the then available agricultural technology, they were still perceived by Tsarist policy-makers as backward and feeble-minded, given the

[57] Nikonow & Schulze (2004) provide a rich account on the history of agricultural science in Russia from the 18th to 20th centuries.

pressure to produce more for a rapidly growing urban population and export markets. The communal system fared badly under market rules: it led peasant households to exhaust the soil, once they had only a temporary claim over it; and it induced the formation of narrow plots of land, inefficiently scattered around the village, what prevented the production of surplus for trading. On the other hand, peasants could share the risk of crop failure. The commune also assured a more diverse assortment of crops, made fertilizers available, and tried to coordinate soil use against depletion by means of the three-field system, in which one third of the soil always lays fallow for recovery.

Josephson et al. (2013) go on affirming that the reforms of Tsar Alexander II, despite conceding the emancipation of the serfs demanded by the intelligentsia, did not achieve its goal of improving agricultural output, once the social structures of rural areas barely changed, with serfs becoming tenants and more fertile lands remaining in the hands of the nobility. While liberals hoped that Western large-scale agricultural practices would be implemented in Russia, peasants were in general skeptical of the benefits of the market, remaining unconvinced by foreign views of success based on the creation of surplus and profit-making:

> "The outsiders wanted to increase the productivity of the soil to support the projects of the state. But the peasants were not in the least concerned with these issues, but with family, subsistence, and communal support" (p.43).

The intelligentsia acknowledged such values and attitudes of the peasants, although it did not succeed in its attempts of more direct forms of communication, as in the case of the "going to the people" initiative of 1873–1874. In any case, the utopian thought of the *narodniki* was encouraged by their belief in "people's rustic, tellurian qualities (…) and rejected as false the whole modern idea of the liberation of humanity through the domination of nature driven by markets and science" (Keane, 2016).

In order to better assess the originality of the intellectual legacy of narodnism, it is necessary to distinguish its wider philosophical grounds on utopian socialism and agrarianism from its more practical approaches, the latter best represented by the terrorist tactics of the faction *Narodnaia Volia*, including the assassination of government officials. While some Soviet historians, including Lenin, did realize the

legitimacy of the historical content and socialist theories of the *narodnik* movement, only a few accounts, according to Tvardovskaia (1978 [1969]), would have taken a closer look into their visions for society or what were their social ideals (e.g. Malinin, 1972; 1991; Malinin & Sidorov, 1963; Pazhitnov, 1918; Potash, 1930).

The historical content, theories, visions and ideals of the *narodniki* were of utmost importance to the development of Russian political economy, despite the fact that the intelligentsia was mostly represented by literary and art critics, poets, novelists, and philosophers. Economic theory was regularly and inconspicuously inserted into their voluminous monthly periodicals and social novels. To Normano (1945, p.8)[58], despite its underground character and lack of immediate influence over economic policy, "[t]he intelligentsia was the bridge between public opinion and revolutionary economics", establishing a deep and long-lasting intellectual influence over state bureaucrats, academics and the reading public at large. Their political economy was comprehensive enough to combine elements of economic theory – somewhat romantically, to the frustration of Lenin and others – with social engineering and utopia. Theoretical arguments were complemented by the underlying ideals or visions for possible worlds and social policy design. As put by Akhabbar and Allisson (2014, p.6) these were

> "the three sides of Russian Political Economy's triangle: positive science explores real worlds (actual states of the world) as well as possible worlds (e.g. with counterfactual statements); as such, utopia is a scientific way to explore ideal possible worlds and is the blueprint for social reforms devised by social engineers".

Bearing in mind the elements above, the economic thought of the *narodnik* intelligentsia can be characterized as a form of socialism that is simultaneously scientific and utopian. If another specific trait is added, namely the rejection of the Promethean view of the eternal abundance of natural resources and the call for wealth distribution as a sound moral imperative and social policy, then these

[58] João Frederico Normano (1887–1945), originally Isaac Ilich Levin, was an economics professor at the University of Saint Petersburg in 1918, before going into exile for his open criticism of bolshevik economics.

thinkers can also be regarded as ecological utopians within the frame of EET presented in Chapter 2. Their emphasis on the role of the *obshchina* is the cornerstone of such a claim, figuring as an element of the real world, subject to social policy and serving as constitutive basis of an ecologically and economically viable social organization.

Chernyshevskii's thought can be used to illustrate these arguments. The next sections expose his main philosophical and economic ideas, seeking to assess to what point he can be considered an ecological utopian thinker. For this purpose, his approach to the natural sciences is examined, as well as his moral views and social ideals in connection to the distribution of natural resources. More specifically, Chernyshevskii's stance on the issue of land and his contestation of Thomas R. Malthus's (1766–1834) political economy are analyzed in order to attest to a body of thought that does not fall short of the definition of ecological utopianism. Finally, an argument is introduced in favor of questioning to what extent this current of EET is a legitimate source of inspiration for a 21st century so-called ecological neo-narodnism.

## 4.1 Chernyshevskii: revolutionary, philosopher, political economist

Chernyshevskii was born in Saratov into a religious family of priests. He received his basic education at the local seminary, although his intellectual interests did not include theology and he would eventually become an atheist. He studied at the History and Philology Faculty of the Saint Petersburg University in the 1840s, when he first had contact with the works of French utopian socialists, especially Charles Fourier (1772–1837), Victor Considérant (1808–1893), and Louis Blanc (1811–1882). In 1854, he started to work for the periodical *Sovremennik*[59] ("*The Contemporary*"), quickly becoming one of its leaders – along with Nekrasov and

[59] The *Sovremennik* was originally an initiative of the great poet Aleksandr Sergeevich Pushkin (1799–1837), having floundered after his death and, a decade later, been restored by Nekrasov. Chernyshevskii, Turgenev, Tolstoi and other prominent members of the intelligentsia had an exclusivity agreement with Nekrasov for publication in the *Sovremennik* during most part of the 1850s and 1860s.

Dobroliubov – and, shortly thereafter, assuming the position of chief editor. He published regularly in the *Sovremennik*, mainly literary reviews and essays on philosophy and political economy, which focused on the peasant question and its importance to the future of socialism in Russia.

Chernyshevskii's writings at the *Sovremennik* would make him a target of the Tsarist regime. His essays had him put under close surveillance by the gendarmerie, finally being arrested in 1862 at the Peter and Paul Fortress. He would write his politically-charged book "*What is to be done*?" from his cell, whose novel-like style deceived the censors and was successfully published in 1863, also in the *Sovremennik*. Since his first arrest, Chernyshevskii would spend most of his life in prison or exile. In 1864, he was sent to Siberia; in 1874, he was granted release upon petition of clemency, which he refused to do; in 1883, he was allowed to settle in Astrakhan under police supervision, a measure to dissuade further revolutionary violent action after the assassination of Tsar Alexander II; finally, in 1889, he was allowed to move to his hometown, where, in that same year, he would die from brain hemorrhage. His works would remain forbidden in Russia until after the Revolution of 1905.

The 1850s and 1860s were a period of extraordinary intellectual activity for Chernyshevskii. He wrote articles, stories, reviews, novels, and plays on issues ranging from literature, art and language to philosophy, natural science, international relations, politics, and political economy. Although the *Sovremennik* was his main outlet, he also had previous texts which appeared in the *Otechesvennye Zapiski* ("Notes of the Fatherland"), a liberal periodical featuring works such as the *Oblomov* (1859) of Ivan Aleksandrovich Goncharov (1812–1891), and to which Belinskii and Herzen were regular contributors.

As an art and literary critic, Chernyshevskii took after the realism of Belinskii. His master thesis entitled *On the Aesthetic Relations of Art to Reality* (Chernyshevskii, 1953 [1855]) would already show a fierce determination and commitment to change reality, revealing a strictly utilitarian view of art and literature as reproduction of nature and life. Such forms of expression would possess the sole purpose of serving utopian social and political goals. This stance rendered him ample criticism from Turgenev, Tolstoi, and Dostoevskii. This is probably the only

aspect in which Lampert (1965) might have a point when portraying Chernyshevskii's materialism as simplistic and limited.

The philosophy of Chernyshevskii, on the other hand, is not easily ascertained. His materialism is mixed with elements of the German romanticism that were cherished by Herzen and other *narodniki* thinkers of the 1840s, as well as with English utilitarianism, French Enlightenment, revolutionary political activism, and the Slavophile ideology. To Frank (1990, p.68), among the *narodnik* intelligentsia of the 1860s,

> "Chernyshevsky [sic] came closest to having a 'philosophy', which combined Helvetius [Claude Adrian Helvétius (1715–1771)] and Holbach [Paul-Henri Thiry, Baron d'Holbach (1723–1789)] with a dash of Feuerbach [Ludwig Feuerbach (1804–1872)] and, for good measure, the influence of Bentham's utilitarianism in its crudest form".

Frank means that Chernyshevskii shared Helvétius's and Holbach's atheism and materialism, a view in which reality was nothing more than matter moving according to cause-and-effect laws. Such a naturalistic view of the world was based on the acknowledgement that the senses were the source of all knowledge and common to all men. Therefore, moral and political phenomena could just as well be explained by empirical observation. Such an outlook would be in accordance with Chernyshevskii's purpose to use philosophy and science as instruments to alter social and political reality, to enforce revolutionary-democratic goals, and to fight tsarism and serfdom. Conversely, Grigorian (1953, p.19) gives more credit to the influence of the "whole course of social life and of advanced public thought in Russia" over the intellectual development of Chernyshevskii. His philosophy would constitute not only an extension, but a more radical version of the materialism of Herzen's *Letters on the Study of Nature* and of the final works of Belinskii, adding to them an emphasis on the class character of science and philosophy.

In *The Anthropological Principle in Philosophy* (Chernyshevskii, 1860)[60], he tried to expose German idealism as a doctrine in favor of bourgeois conservatism, providing a theory and ideology for the maintenance of class relations of feudal systems. He attacked Kant, Schelling, and Hegel due to what he perceived were attempts to reconcile philosophy and feudalism. Nonetheless, Chernyshevskii praised Hegel's dialectics and tried to disentangle it from mysticism in order to build on his notion of development, another aspect that brought him closer to Marx's dialectical materialism, even if, by then, he was not yet acquainted with Marx's theory (Grigorian, 1953).

One of the instances in which Chernyshevskii most vigorously put forth his dialectical argumentation in the context of development was his assertion on the circling back of the final stage of a phenomenon to its initial phase. Earlier social organizations based on communal property would eventually prevail over those based on private property of the means of production. The enduring presence of the traditional *obshchina* would favor this process in Russia, including the possibility to skip a capitalistic stage. However, the purportedly oncoming stage of development based on the *obshchina* would rest upon a new basis: a modern collective organization of the peasantry, aware of its role in the cultural development of Russia and obstinately ready to reject any form of oppression. In his *Criticism of Philosophical Prejudices Against Communal Ownership* (Chernyshevskii, 1858a), Chernyshevskii claims that the exploitation of the masses that took place in Western capitalistic countries did not necessarily have to – and should not – be the fate of Russians, although he acknowledged the technical advancements that such an economic system usually brings along with itself. This was one of the occasions in which Chernyshevskii appealed to more abstract lines of thought, contradicting his own opposition to idealism and

[60] Many of Chernyshevskii's articles were compiled in 1906 in a ten-volume publication (*Polnoe Sobranie Sochinenii v 10 Tomakh s 4 Portetrami* [Complete Works in 10 Volumes with 4 Portraits], Saint Petersburg: Tipografiia Ts. Kraiza, 1906) and made electronically available by the project *Elektronnoe Nauchnoe Izdanie "N. G. Chernyshevskii"* (Electronic Scientific Publications of N. G. Chernyshevskii), supported by the *Rossiiskii Gumanitarnyi Nauchnyi Fond* (Russian Foundation for Humanities), grant 12-04-12003 v. (available at http://ngchernyshevsky.ru/). However, for the sake of clearance, Chernyshevskii's articles in the *Sovremennik* are cited here separately, and the original reference is given in the list of references.

conforming to his putative characterization as a utopian socialist, even though he never abandoned the dialectical method.

Chernyshevskii's anthropological principle in philosophy related to the unicity of the nature of man, denying the idealist, dual approach that would have forced the separation between the abstract realm of thought and the physical, sensory realm of life. Man would be an indivisible whole, bearing an integral personality, mind and body as a single organism which expresses lower and higher forms of organized matter. In this respect, Chernyshevskii's materialism draws near Bogdanov's empiriomonism (see Chapter 3).

The materialism of Chernyshevskii was similar to Feuerbach's call for the centrality of anthropology to philosophy, despite the fact that the former did not give the same amount of time and effort to an assessment of religion, as the latter did. Their stress on the role of anthropology to the development of a materialist philosophy led to a call for an atheist humanism that, somewhat contradictorily, draws not only from historical and scientific materialism, but also from the heavily criticized idealism. As the materialist solution to the philosophical problem posed by the relationship between mind and body, or between man and nature, proved to be satisfactory to Chernyshevskii, things were different when applying materialism to social life:

> "it [materialism] proved incapable of explaining the transition from the abstract to the concrete, historical man, i.e., of providing a materialist solution of the problems concerning the theory of society. Chernyshevsky's [sic] anthropological principle is materialism when it is applied to nature, but it is idealism when it is used to explain the transition to history" (Grigorian, 1953, p.26).

Chernyshevskii would transcend this dichotomy using his sharp understanding of the dynamics of class struggle throughout history, which he would also apply to his views on ethics, sociology, and political economy. Whereas his concern with development, economic and material conditions complied with the tenets of historical materialism, it did not evolve into a full theory on relations of production, what makes him a political economist of the pre-Marx era. Moreover, his historical stance on social phenomena would set him apart from Feuebarch's altruism and bring him closer to Helvétius's and Holbach's psychological egoism, or, even more blatantly, to Bentham's and Mill's rational egoism (Frank, 1990). The tricky part is

that Chernyshevskii distorted such propositions to state that the altruistic conduct is in fact the ultimate way to serve one's own purposes.

Chernyshevskii's rational egoism is based on the integrality of man, his natural requirements and conditions for happiness. He addresses the man who freely seeks to protect his own interests – not abstract ideas, but interests affecting his reality – as an egoist, and contrasts such a man with the submissive and obedient individual. His ethical view on rational egoism opposed the "bourgeois-philistine ethics of crude, narrow, self-interest" (Grigorian, 1953, p.42), aiming to combine individual and public interest, as the common good would be inherently embedded into one's self-interests. When that is not the case, the mode of social organization was to blame, since individual actions and requirements for happiness are contingent on social life. If the norms of the prevailing social system harmonize individual and collective interests, then people would be naturally able to reach a higher moral ground. Egoism and altruism would become aligned through rational motivation and in an egalitarian manner, since all men are equal and, given appropriate social circumstances, would equally abide by the principle of the greatest good for the greatest number.

Therefore, as discussed in Chapter 3, Chernyshevskii's reinterpretation of English utilitarianism corresponds to an understanding of rational egoism that would promote utopian socialism, in the same manner as, for Feuerbach, egoism would lead to communism (Feuerbach, 1845). Chernyshevskii (1987, pp.70-145) gave special attention to Mill's *Principles of Political Economy* (1848), having translated and added lengthy notes to it in 1860. He criticized Mill's preference (as a follower of Smith and the English Classical School) for a psychology of the middle classes, neglecting the historical formation of the poor. He also deemed Mill's approach unsatisfactory in the context of the real causes of production, human requirements and the toils of laborers to create the means of subsistence. Wealth could only be assessed in connection with the purchasing power of the people. To Chernyshevskii, labor was the sole agent of production and, therefore, its proceedings (including capital, which he regarded as the product of labor aimed at augmenting future production) should be divided among those who take part in it. Competition was an inherent feature of Western economic systems; it would more

properly apply to a system based on the exchange of goods, and not to one in which the product would be distributed among laborers. This would be a disadvantage of capitalism, as the need to lower prices in competitive economies led to a push toward lower wages. Chernyshevskii envisaged a system in which production costs would replace prices as the key economic variable, leading to a more adequate way to address human requirements and to regulate production than market mechanisms. In such an alternative system, there would be no trade-off between wages, profits and rent – as income becomes a sole category – neither the contradiction posed by the necessary gains of labor productivity and diminishing well-being of laborers (Turin, 1930).

Such views opposed Chernyshevskii's political economy, to some extent based on German romanticism and the idea that the economy had an intrinsically organic character (Normano, 1945, p.90), and the English Classical School, which advocated for economic individualism and refrained from emphasizing class struggle and power relations as important elements to a proper appraisal of an economy.

Chernyshevskii's philosophy, political economy, and revolutionary activism were cunningly embodied in his epoch-making novel *What is to Be Done*, a bedside book for the younger generations of revolutionaries, including Plekhanov and Lenin[61]. The main character, a young woman named Vera Pavlovna, seeks to escape from the traditional ways of her family and arranges a forged marriage to obtain economic independence and freedom. She ventures into a sewing cooperative, inspired by the social ideals of French utopian socialists, and, even closer to the core of the plot, by the theories of the intellectuals of the new generation, i.e. the *narodnik* intelligentsia.

Through the worldviews of Lopukhov and Kirsanov, the main theorists among the characters of the book, the author continuously praises the materialism, rational

[61] Plekhanov's and Lenin's praise of Chernyshevskii's main novel would also point to the *narodnik* roots of the 1905 revolution. To Frank (1990, p.200), "there is thus a clear line of historical affiliation between Chernyshevsky's [sic] novel and the Leninist ideal of the Bolshevik".

egoism and egalitarianism of the new generation, pointing to a future of human emancipation, in which justice and prosperity prevails. Not only are the poor to gain, but also women. Chernyshevskii envisions gender equality in terms of work relations and sexual behavior, an early display of proto-feminism that is openly borrowed from the novels of Jean-Jacques Rousseau (1712–1778) and George Sand (1804–1876). Rational egoism is an underlying trait of this new generation, whose members found it personally aggravating to see others in adverse situations, including laborers and women forced into submission. Thus, egoism and altruism are again claimed to share the same outcome: strengthened community values and social equity, if only unhindered by the economic circumstances imposed by the prevailing mode of social organization. And here is where the intelligentsia would be most useful: the duty of the "learned people" would be to educate and lead the laboring masses, as represented by the efforts of Vera Pavlovna in the sewing cooperative and of Lopukhov in the factory where he worked as assistant manager.

The character of Rakhmetov is the symbol of the new generation of radicals and their materialist philosophy. He was the descendant of a family of wealthy landowners, having supposedly freed his serfs and given them allotments of land. He was interested in natural sciences and studied philology, also displaying formidable physical strength due to his experience with hard labor of different sorts[62]. Such a combination conferred him great fame among the young revolutionaries, an intellectual that was also part of the common people, well-equipped to defend the revolution not only in theory, but also in arms (and, also, to endure the hardships of likely imprisonment by the tsar). His ruthless discipline and pledge to the revolutionary cause, voluntarily forfeiting any self-indulgence, apart from smoking cigars, would grant him the epithet of "the rigorist" and inspire many young radicals in their fight against the tsar in the last quarter of the 19th century.

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[62] Chernyshevskii compared Rakhmetov to the *bogatyr*, Slavic heros of old epic poems dating back as far as the eleventh century, called *bylina*.

In Vera Pavlovna's fourth dream, the future and ideal society is the result of scientific progress and social revolution. It is shaped by tight social bonds, developed by means of the communal character of the main aspects of life, stretching beyond the sphere of labor relations. Enjoyment of life is only achievable by means of shared love, beauty and wealth. Technical progress leads to greater agricultural productivity, advanced architecture, and the replacement of harsh labor duties by the use of heavy machinery. In such conditions, humans would be able to express their integral personalities, with the ultimate resolution of social and personal problems and the demise of the trade-off between common and personal interests. Self-realization comes only as a consequence of collective efforts. Human emancipation means a just and prosperous world for all. These elements are also present in the development of the sewing cooperative of Vera Pavlovna, as workers willfully start to share domestic and leisure activities, to the point that the interests of the community corresponded to their individual interests.

Vera's fourth dream brings as main principle the equality of rights, without which there is no real freedom or joy. This is also applicable to the relationship between man and nature. There is no dominance, no master and mastered, only their integration into a whole that transcends the sum of its parts. Chernyshevskii's ideal socialist society is, thus, also ecologically sound. Fields, gardens and groves are carefully nurtured. This is a first hint into the ecological aspect of his utopianism, the refusal to accept the modern Promethean conception of nature, and the recourse to egalitarianism as means to integrate humans and nature in a lasting and fulfilling manner. Basic human needs are promptly satisfied by nature through labor. Luxurious whims are treated as such, and are, therefore, costly; there is no eternal abundance of recourses. Chernyshevskii preaches the rational use of resources for the common good, not exploitation of nature's alleged infinite bounty. People abide by the offerings of the seasons, and yearly migrations are only natural. Cities are no longer the basic form of human settlement, being used mainly as centers of communication and transportation. Most people live in rural areas, organized in ways that resemble the traditional Russian *obshchina*. Although, in Vera's fourth dream, a desert is transformed into a "land of honey and milk" by means of irrigation and soil science, the interdependence between man

and nature is the underlying principle, not the mastery of the latter for sake of the accumulation of wealth.

Stites (1989) supports such an ecological component in Chernyshevskii's novel, affirming that the Northern Commune of Vera Pavlovna's fourth dream

> "does not depend on futurist technology for its "eternal happiness". The palace of glass and steel (so hated by Dostoevsky), the light metallic furniture, the farm machinery, and the canopy are clearly marginal adornments to the central vision, which is pastoral. No cities or factories are mentioned or projected. Nature is exalted in graphic terms, and the verdure, the fields, the meadows, the mountains, and the forests are a source of joy and human renewal. Except for domestic chores, performed by children and old folks, all work is done outdoors. Minimum technology, material prosperity, and sanitation (the glass motif representing both cleanliness and enlightenment) were acceptable to a science-worshipping generation of radicals and nihilists. But the dynamic city as such held no charm" (p.26).

Having taken a first glance into elements of Chernyshevskii's philosophy, political economy, and revolutionary utopian thought, the next section addresses his understanding of and belief in the natural sciences; how these permeate his worldview and affect his moral views and social ideals; and to which extent his scientific utopianism can lead to the deduction of an ecological utopianism.

## 4.2 Chernyshevskii on the natural sciences

It would be hard to overestimate the importance of the natural (or exact) sciences to Chernyshevskii, who saw them as that part of philosophy concerned with the "problems of man and of external nature" (Chernyshevskii, 1860). Many of his essays containing his views on the nature and progress of the natural sciences point unequivocally to how subjects such as chemistry, biology, geology, botany, astronomy, and geography were highly esteemed by him. He stated that "[c]hemistry is, perhaps, the greatest glory of our age" (p.80). In *The Anthropological Principle in Philosophy*, Chernyshevskii assigned the greatest accomplishments in human history to our ability to reason. Science would be the language in which nature reveals itself (in this metaphor, mathematics would be the main dialect). Albeit humans were still not able to explain every natural phenomenon, it was only a matter of time, and to resort to other forms of gaining

knowledge was not the right path. The systematic application of inductive logic would be the only way to determine the general elements, forces, and laws governing nature. Observation and experimentation – even more so after the technical progress of scientific instruments – would be an important aid in this pursuit to unveil the truth by means of reason.

The moral sciences, on the other hand, such as psychology and metaphysics, would hitherto display a disputable character, being usually unable to provide definitive answers and, thus, providing the stage to never-ending debates between opposing views. However, according to Chernyshevskii, as the scientific reasoning of the natural sciences started to be applied to the moral sciences, the latter would soon rise up to the level of the former, becoming able to assist man in his struggle to find truth and shed light on the old obscurantist ways.

In Chernyshevskii's eyes, the natural sciences and its mode of investigation would be crucial to validate his moral views and social ideals. As seen in the preceding section, a form of social organization that promotes the common good was, to him, objectively rational, even from the perspective of the individual. His utopia was scientific. In *What Is to Be Done?*, the ideal society would be the result of the combination of technological progress and social transformation, with feedback loops among them. Chernyshevskii allegorically mentions the passage from the iron to the golden age, supported by scientific development on the one hand, and by human enlightenment on the other. Individuals would grow into their best self, free from social convention, economic dominance, and institutional restrictions, to exert their integral personalities, aided by technology and in accordance with the precepts of a rational egoism that leads to the ideal communal life. His novel contains several allegorical representations of the revolutionary transformation of society based on scientific development and social revolution, such as in Vera Pavlovna's second and fourth dreams. Her second dream depicts the benefits to agricultural output of the scientific breakthroughs of Justus von Liebig (1803–1873), and draws a parallel between drainage techniques and social transformation, emphasizing the importance of movement, as opposed to stagnation. These elements justify the claim that, while *narodnik* intellectuals as a whole are deemed to be utopian socialists, Chernyshevskii (and other *narodniki* of

the 1860s, such as Dobroliubov) can be regarded as a champion of socialism as scientific utopianism.

There is evidence, however, that his scientific utopianism is of a particular sort. To Chernyshevskii, the unicity of nature and man, as professed by materialists, was clearly attested by the natural sciences. Matter and movement are the sources of all creation, and the diversity seen in the world is a question of varying qualitative properties. Different chemical combinations led to different structures, with different and sometimes incommensurable qualities. Knowledge would be, therefore, a gradual and cumulative endeavor, in which the character of what is known helps to uncover the unknown, especially by means of negative statements based on different properties among them.

Bearing these principles in mind, Chernyshevskii would discover in physiology the quintessence of natural science. At first, physiology is merely a subject derived from chemistry and consisting in the study of plant and animal organisms. Nevertheless, he takes it to heart when he realizes that it ultimately deals with the qualitative properties of matter, the constant dialectical change and development of these organisms, propelled by struggle, opposing tendencies, divergent forces, and inherent contradictions that are part of a circumstantial and objective reality, not abstractions or metaphysical entities. Chernyshevskii, in this respect, uses dialectics as a form of escaping the crude mechanicism of older forms of materialism (Grigorian, 1953).

The concept of energy appears to Chernyshevskii as a synonym of “force”, or “that identical thing which produces identical actions” (Chernyshevskii, 1953 [1884], p.507)[63]. It would be an intrinsic feature of matter, once “an acting force is the acting object itself; and the energy of an object is the object itself”. Objects with identical properties would yield identical actions, which are to be regarded as the

[63] Chernyshevskii’s ideas on energy appeared in the 1880s, while translating to the Russian and adding comments to the book *Energy in Nature*, first published in 1883 by William Lant Carpenter (1841–1890), son of the prominent British physiologist William Benjamin Carpenter (1813–1885). Chernyshevskii fiercely opposed Carpenter’s anthropomorphic interpretation of natural phenomena.

laws of nature. Energy was, thus, within the realm of physiology, another term for his notion of movement as the origin of reality and the source of life. Matter and energy were the basic building blocks to the study of the functioning of plant and animal organisms, with focus on processes, relationships and connections between them. Analogously, flows and stocks of matter and energy are now the basic units of analysis in modern ecological science (see Chapter 2).

Energy was also the ability to do work. The comparison was to him irresistible: in many passages of *What Is to Be Done?*, he praises labor as another manifestation of this force, movement, or energy that shapes reality, and the revolution would be an inevitable consequence of such force (references to French physiologist Claude Bernard [1813–1878] abound). This is clear in Vera Pavlovna's second dream. She is also taken aback by how solar energy induces transformations in the structure of living matter, resulting in compounds of higher complexity. Although it would be troublesome to attribute to Chernyshevskii a role as precursor of social energetics, his philosophy of science and praise for physiology certainly influenced his views on social issues. His standpoint on how energy fits into cultural development resembles the stance of Bukharin and Bogdanov, who adopted an intermediary position in terms of energetic reductionism (see Chapter 2). Moreover, his materialist philosophy in the context of physiology is strikingly similar to Bogdanov's Tektology (see Chapter 3). Therefore, Chernyshevskii's views on the natural sciences, as they have been interpreted here, amount not only to the fact that his work is genuinely a part of the history of EET, but also to his characterization as an ecological utopian.

There is, however, still one issue to tackle. Chernyshevskii's faith in the prowess of the natural sciences is accompanied by normative statements about their purposes. In his novel, he recurrently asserts that the natural sciences should solve the problems of man. It should make it possible to men and women to have their basic needs fulfilled[64], to develop their true potentialities, and live in joy and

[64] Chernyshevskii saw the satisfaction of human needs as a requirement to the preservation and expansion of human rights, which would lie at the core of the concept of justice. Every individual was obliged to prevent injustice within his capacity. Analogously, the state should intervene in the economy whenever justice needed to be served (Chernyshevskii, 1859a).

freedom, protected against a coarse, subsisting existence without meaning. Although there is not a Promethean tone in his view of the benefits of science (the subjugation of external nature is never mentioned), he is overly optimistic in relation to the boundaries of technological progress. In *The Anthropological Principle in Philosophy*, he predicts that

> "in the present state of mechanics and chemistry, with the means with which these sciences provide agriculture, the land in every country in the temperate zone could provide ever so much more food than is needed for an abundant supply of provisions for populations ten and twenty times larger than the present populations of these countries. Thus, external nature creates no obstacles to supplying the entire population of every civilized country with an abundance of food; the only task that remains is to make people conscious of the possibility and necessity of energetically striving towards this goal" (Chernyshevskii, 1953 [1860], p.102).

He does not offer references for such arguments, but goes on to argue, for example, that, in England, land could feed at least 150 million people, if modern agricultural techniques were to be implemented in each field. The neglect for any acknowledgement that there are limits to nature's bounty is not a particular trait of Chernyshevskii, as technological progress and growing reserves of natural resources seemed quite promising to most thinkers of the 19$^{th}$ century (and rightfully so, as the scale of economic processes was then exceeded by that of natural processes by orders of magnitude). Land is quite representative in this regard. It was still seen as the main natural resource available; it was the means by which the *obshchina* either thrived or perished; and its distribution was one of the motives behind the impetus for revolution.

Therefore, while Chernyshevskii's ecological utopianism (i) is rooted in the natural sciences; (ii) takes into account matter and energy as determinants to cultural development; and (iii) calls for moral views and social ideals based on a rational egoism that promotes egalitarianism, it is necessary to investigate to what extent he deemed land as a limited natural resource and how he thought it should be distributed to serve the purposes of human emancipation.

## 4.3 The ecological utopianism of Chernyshevskii: the redemption of land

The many aspects concerning the issue of land appear in most of Chernyshevskii's work. There are, however, a few essays by him, written between 1857 and 1861 (i.e. before his imprisonment) and published in the *Sovremennik*, in which land and the peasantry occupy center stage. The main topic was the emancipation of serfs (which would only be effectuated in 1861) and how it was supposed to be undertaken. Such essays are part of Chernyshevskii's intellectual clashes against Russian political economists who opposed the cause of the serfs, and against those who favored a type of agrarian reform that would maintain the most fertile lands in the hands of the nobility and hinder any significant improvement in the life of the mass of poor peasants. In these writings, land is treated as a limited natural resource that should be distributed according to the precepts of justice and in the light of the teachings of Classical political economy, according to which the elimination of compulsory labor would foster Russian economic development.

Chernyshevskii proposed a radical transformation in the structure of the Russian peasant economy. In the first of such essays, entitled *On Land Ownership* (Chernyshevskii, 1857), he stresses the need to preserve and expand communal ownership in Russia. In a very harsh tone, he attacked the work of political economist Ivan Vasilevich Vernadskii (1821–1884)[65], who denied the benefits of communal property, claiming that Vernadskii had completely failed to grasp the consequences of the empirical findings of the field research of August von Haxthausen (1792–1866) on rural communal institutions in Russia, published a few years before in book form. Haxthausen had argued that such rural communes had to their advantage the capacity to act as mediators between individual peasants and society at large, therefore allowing a more natural process of social integration, based on customs and traditions, instead of relying on top-down legal schemes suggested by intellectuals and bureaucrats. Chernyshevskii mentioned

[65] The father of ecologist Vladimir Vernadskii (see Chapter 3).

how Haxthausen deemed as successful the way land was divided in the *obshchina*. Either each household received a plot and worked on it, or, in more evolved communities, plots were collectively worked, and the harvest was divided among households. Moreover, both types of community would value free will and entrepreneurship, realizing that these were active principles in communal rural life, balancing external forces pushing for centralization and the maintenance of bureaucracy.

Chernyshevskii challenged the claim in which private ownership of land would lead to higher productivity. To him, the fact that the most developed agricultural lands in Europe were cultivated under the regime of private property did not mean that this was the underlying reason. In his analysis of the data provided by Haxthausen, he did not see any significant differences in the agricultural techniques employed in fields owned either privately or collectively. He calls attention to the fact that lands under both ownership systems used the same expedients to cut down forests (with deleterious effects on the soil, such as erosion); in both cases, the three-field system was being gradually replaced by crop rotation practices. Chernyshevskii recurs to Smith, when the latter argued in *The Wealth of Nations* that wealthy landowners tended not to improve land properly; they preferred to either spend their income with luxury or buy more land than to improve existing fields. In Russia that was also true, and the rural communes would probably fare better than big estates in terms of land improvement.

The promise of greater agricultural yields would be linked to the prevailing institutions and social conditions, such as the legal system, size and density of population, and communication and transportation infrastructure, and not so much to the type of ownership of land. However, given the right social circumstances, improvements would be made more easily and quickly in communally owned fields.

He compared the regimes of land ownership present in Russia with those in Western countries, such as Austria, England and France, arguing that in all of them the evidence pointed to the same observations: higher monetary gross incomes in privately owned lands contrasted with better lives to a higher number of households in communally owned lands, mainly as a consequence of the access

to a higher share of the product. Hence, most of the rural population would benefit from the establishment of more rural communes. To him, the *obshchiny* would be more beneficial to the country than private farms, since a civilized society should, above all, seek justice, i.e. strive to alleviate poverty. Land use policy should aim at the satisfaction of the basic needs of the greatest number of people, not to maximize yields and profits for purposes of wealth accumulation of a few. Chernyshevskii was clearly not against productivity gains (as seen in the previous section) or higher gross incomes; however, such parameters were not the main goal, but a means toward human emancipation through a more prosperous life for the masses of miserable peasants.

He identified two factors that favored the future expansion of rural communes. On the one hand, a notion widely accepted among Classical political economists, namely that the fragmentation of large estates in France and other Western countries (due to inheritance law), which led to the appearance of smaller plots of land in the hands of a greater number of landowners, was beneficial to the national economy. On the other hand, the particularities of the technical progresses of soil science: from drainage, irrigation, and fertilization to planting, harvesting, and threshing. These processes would be better suited to larger tracts of land. The rural communes, thus, would appear as a viable alternative:

> “They either have to abandon the cultivation of their plots, or unite in society for the cultivation of land. (…) That is why now every reasonable French economist, to whatever school he belongs to, sees the benefits of agricultural unions in France” (Chernyshevskii, 1857, p.458).

Chernyshevskii did not stood by an immediate elimination of all private ownership of land, given the likely resistance of a substantial part of the population that clung to the old ways and customs. People should decide their own fate; also, he who considered himself uniquely laborious or ingenious should be allowed to privately own and cultivate his land. Conversely, the *obshchina* would always be open to those in need and willing to farm the land.

The transformation would be gradual. After communal ownership was a reality, rural communal labor would be the next step. While the former only prevented peasants from becoming urban proletarians, the latter would contribute to

augmenting agricultural production. Nonetheless, an “agreement on communal production is much more difficult than agreement on communal ownership” (p.461), since it would be difficult to control the diligence of work (free-riding) and, thus, require a higher level of trust. Communal consumption would be the last stage in this process of communalization, being also more difficult to achieve outside of the family circle. This meant that such schemes would have to be instilled in the peasantry by the intelligentsia.

In the essay *On the New Conditions of Rural Life* (Chernyshevskii, 1858b), he restated his opposition to liberal political economists, to whom the abolition of serfdom would harm agricultural output in a country that was already behind the West in terms of productivity. Rational egoism was, once more, a key theoretical element to the argument that former serfs would work more diligently if they had their own reasons for it. Benefits would be extended to landowners as well, as their profits would, according to his economic forecasts, be higher if production was based on hired workers. This statement, however, had also served as a rhetorical argument to appease the fury of the nobility; Chernyshevskii would soon present his actual ideas for the structure of the post-serfdom peasant economy.

In the following year, Chernyshevskii would provide a clearer picture of his visions for the peasant economy in a series of essays called *Organization of the Mode of Life of Land-Owning Peasants*. The sixth essay, *Is the Redemption of Land Difficult?* (Chernyshevskii, 1859b), addresses the challenges involved in redeeming the land owned by the nobility. He demanded the end of serfdom and the nationalization of lands in which the serfs lived and worked, without any form of indemnification for landowners. In fact, he argued that, in addition to the redemption of land in favor of former serfs, landowners also needed to forfeit extra tracts of land as compensation for their previous misconduct toward the peasants. Other schemes of land redemption devised by Chernyshevskii included monetary restitutions to peasants, payable either by landowners, merchants, or the state. These were the usurpers who had been exploiting the starving masses and needed to be punished with the expropriation of their property.

After such schemes had been enforced, Chernyshevskii claimed that the distribution of land allotments among the emancipated serfs would follow the

customs already in place in existing rural communes. The projects formulated by the noble bureaucracy and put forth by the provincial committees would have no place in the structure of the new, free peasant economy. Although his proposals often displayed a moderate tone due to censorship, he managed to expose the feudal nature of the reforms that were being prepared by the Tsar, providing strong legal and historical arguments (Chernyshevskii, 1859c).

## 4.4 Technical progress, social reform and human development: a rebuttal to Malthusianism

In Chernyshevskii's essays of the late 1850s discussed above, he recurrently shows his contempt for Malthus's political economy[66], a "murderous system" that sought to preserve "the need for vice and poverty in the mass for the happiness of the chosen ones of fate" (Chernyshevskii, 1857, p.445). His rebuttal of Malthus's stance on land and population might provide another token of his understanding of the interplay between nature and man, or, more specifically, between natural laws and cultural development.

Malthus's 1798 *An Essay on the Principle of Population* was a reaction to the utopian, egalitarian society praised by William Godwin (1756–1836) in his *An Enquiry Concerning Political Justice* (1793). To Malthus, such a society would certainly circle back to the existing unequal social system and its structure based on private property. Humans could not escape the laws imposed by nature to plants and animals; they had to compete against each other and struggle to survive. Also, given the fact that the agricultural productivity of labor on a certain piece of land is in inverse ratio to the amount of labor cultivating this piece of land, population growth would eventually lead to a decline in *per capita* agricultural output. Unless people practiced moral restraint, the poorest parcel of a growing population would perish until its numbers receded to the point in which food production was again sufficient. The coarseness of the manners of the poor were

[66] Chernyshevskii's anti-malthusianism was not, as expected, an exception among *narodnik* thinkers. Herzen, Tkachev, Pisarev, Mikhailovskii, Lavrov and others also fiercely rejected Malthus's ideas.

to blame. Using these arguments, Malthus opposed any radical changes to the existing institutions – especially private property – as without them the laws of nature would act even more aggressively in the creation of misery and famine.

Chernyshevskii's more extensive writings on Malthus's political economy appeared in the form of supplementary comments to his translation of Mill's *Principles of Political Economy*[67] (Chernyshevskii, 1949a; 1949b [1860-1861]). His notes to Books II and III focused mainly on the problems of competition and their impacts over profits and wages (as discussed in Section 4.2). Chernyshevskii stressed how competition was influenced by population growth and was disappointed at Mill for not having given the due importance to this matter in the latter's criticism of Malthus's theories. Labor supply and demand hinged on the size of population, and therefore wages were directly affected by it.

In his notes to Mill's *Principles*, Chernyshevskii brings demographic and agricultural data and performs hypothetical calculations to challenge Malthus's theories. He agrees with Malthus that population growth might lead to decreasing agricultural productivity, but argues that the English economist would have only scratched the surface of the issue, not pursuing in depth the mathematics needed to truly understand the phenomena or to assess the ensuing questions.

Chernyshevskii analyzes the case of France, where, according to Malthus, starvation and malady affecting a large portion of this populous country were caused by the lack of food. In order to solve the problem of insufficient food supply, an increase in agricultural labor was necessary. However, additional lands are usually not as fertile as the ones being cultivated at the time. In the absence of technical improvements on the land, productivity (output per laborer) is, therefore, diminished. To Chernyshevskii, this was the first shortcoming of Malthus: to ignore that improvements may be able to offset the poorer quality of the soil of these newly cultivated lands. Malthus did not bother to provide any contrary evidence in this regard. So, Chernyshevskii carries on, as time passes, improvements would

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[67] Chernyshevskii did not fully translate or comment the chapters on property and communism in Book II of Mill's *Principles* as a result of censorship (Turin, 1930).

need to keep up with such a marginal loss of soil fertility and with population growth, in order to maintain a certain level of productivity. These two main opposing forces, improvements and population growth, would regulate the level of productivity in agriculture.

Neither Malthus, nor Mill, however, were particularly optimistic about the potential of improvements to compensate for population growth. But Chernyshevskii delved deeper into the matter. He realized that the first step was to assess how strong the force of population growth was. If the rate of population growth is known, he argued, then the necessary rate of progress in land improvements to feed the masses is also known. Chernyshevskii reprimanded Malthus for never proposing this simple exercise, preferring to blame human nature for the "inevitable" suffering of the poor and to preach moral restrain. Malthus's hidden agenda against attempts of social reform was no secret to Chernyshevskii: "to show that human disasters stem most fundamentally not from the shortcomings of the economic system, but from the laws of nature itself (…)" (Chernyshevskii, 1949a [1860–1861], p.751). Malthus's poor scientific abilities to demonstrate his results had revealed his ideological biases.

Furthermore, if land improvements were important to sustain the basic requirements of the population, the question economists needed to answer was how to attract capital to implement such improvements. Chernyshevskii states that, if the premise that capital is a special kind of labor is accepted, then the necessary capital for the implementation of the required improvements could be obtained by turning more people to farming (and away from non-productive urban activities); devising new ways to organize cultivation; introducing crop rotation and other advanced agricultural techniques, such as greenhouses; making better use of livestock; applying fertilizers; and so on. While fixed capital was the most important form of agricultural improvement, the current economic system did not stimulate such a vital endeavor, as the shares of income corresponding to profits and rent did not flow into rural areas due to lower financial yields.

"[T]ake whatever speed you want to reproduce, the agricultural product will have time to grow with the same speed if people themselves want to take care of it" (Chernyshevskii, 1949b, p.287). If, at times, Chernyshevskii seems overly

optimistic toward the capacity of humans to improve their fields, most passages of his extensive notes on this matter show that, in fact, he challenges the appealing notion of relentless population growth, even when unfettered by external forces such as famine and disease. He easily rejects Malthus's empirical findings, who cleverly chose as his best example the high reproduction rates among North Americans (a doubling time of ca. 15 years), neglecting the obvious effects of immigration and other exceptional social circumstances present during the process of resettlement.

Chernyshevskii believed that 35 years would be a more plausible figure of population doubling time. Still, most of his hypothetical exercises met Malthus half way, i.e. 25 years. He called attention to the flaws of Malthus's calculations, in which improvements would happen at once after the end of population doubling periods. He repeated the same calculations using constant annual gains and arrived at a radically different result: instead of an increase in improvements of *circa* 33% every 25 years, the necessary increase to offset population growth would not be higher than approximately 2% over the same period, since improvements are now spread along the 25-year timeframe and not only at the end of it. Chernyshevskii did not spare Malthus of his acid irony: the great political economist Thomas Malthus would have forgotten about the effects of compound interests!

Going back to the determinants of the rate of population growth, Chernyshevskii sought to establish the rules governing this phenomenon. He believed there was a natural rate of human reproduction, determined by the physiological qualities of human beings. If the actual rate of reproduction was different than such a natural rate – either higher or lower – then the conditions of life allowed by the current mode of social organization would be unsatisfactory, and such a mode of social organization was to blame. There is a novelty in this argument, once Chernyshevskii is not only asserting that lower reproduction rates were a consequence of a social system that is prejudicial to human development, since they aggravated misery and grief for the poor; he also means that abnormally higher reproduction rates were the outcome of a social system that moved against human nature, provoking unnecessary distress for women and preventing the

attainment of a healthy balance between human populations and the means to meet the basic needs of all.

Whereas more recent social circumstances in industrialized Western countries often led to diminished reproduction rates, as factory workers were prevented from getting married and the urban middle classes increasingly refrained from giving birth to many children, the conditions in former times or in most countries were quite different.

> Necessity does not prevent our villagers from either entering into marriage or from having children, it acts between them in completely the opposite way. If the family is left without an adult man, the need forces a growing young man to marry as soon as possible - this is (the only) way to improve economic affairs. And in every family, the man tries to marry his sons as soon as possible in order to have free workers. The widowed peasant marries again because without his marriage his household would be upset. Exactly the same is the situation in all of Austria, in most of Prussia. The need, the fear of need, or the calculations that are peculiar to the needy class, increase the number of marriages in the agricultural population of these countries, force young people to marry earlier than they would like. In the same way acts the rudeness of morals in the main mass of the population of Eastern Europe. In the lower strata of the urban population, it now contributes to celibacy, but in the rural population it does not at all have this action, but only leads to the fact that the wife continues to have children even when, due to exhaustion, she would rather have abstained from it (if only she was not coerced). The same action has the coarseness of morals and the needs of the agricultural population of England itself. From this it follows that, if in some strata of some European societies circumstances adverse to reproduction reduce the number of births, in other strata of the same societies and in the whole mass of the population of other societies these circumstances, on the contrary, bring the number of births to a value that could not be achieved with greater wealth and less coarseness of morals. The one who examines the affair will be assured that in Russia, Austria, Italy, in the eastern half of Prussia, all of eastern Germany, the actual number of births is no less, but on the contrary, much more than the percentage that would have been if all the impediments to reproduction were completely eliminated. In France and in England, (of course, now) not; but even there it was not very long ago in the same way: poverty did not reduce, but increased the number of births" (Chernyshevskii, 1949b [1860–1861], p.297).

Therefore, Chernyshevskii claims that poverty and coarse morals tend to increase the number of births and place the reproduction rate above the natural one, i.e. the one which would be in effect if all classes enjoyed high levels of well-being and freedom to pursue their natural drives. This means that the geometrical growth of

population put forward by Malthus was not a natural law, humanity was not doomed to suffer under the yoke of population checks. Social reform (i.e. revolution) would provide the requirements to lower the rate of reproduction so as to verge on the natural rate, the latter understood not as a law of nature, but a rate in which people, having their basic needs fulfilled, were free to pursue their real desires and purposes in life. Hence, such a natural rate of reproduction was, in fact, the result of favorable social conditions and norms, which varied between countries, classes, ethnicities, and religions.

In order to reach such a state of affairs, human development was crucial. Proper education was necessary to set people free from the old social norms and public opinion, and to let them follow their natural volitions in a new light. Chernyshevskii thought that, “if the present rudeness of family relations is eliminated by the action of pervasive enlightenment, reproduction will cease and the number of the population will increase only as a result of social need; and when there is no need for it, there will be no reproduction” (1949b [1860–1861], p.308-309). Thus, he believed that enlightened populations would naturally feel the need to extend their numbers only if there was a need for it; population growth could stop altogether if people reached a level of rational consciousness in which their wants matched social needs.

On a wider time scale, the current mode of social organization could not stop the advancement of human development. “Do you really think that your great-great-grandchildren will be the same [barbarians] as you?” (1949b [1860–1861], p.307), he asks, calling barbarians those “who cannot respect a woman, who do not recognize the feelings of youth” (p.308). But what was the required degree of mass enlightenment to induce a birth rate that maintains the desired rate of population growth? Chernyshevskii could not answer this question, pointing to the need for more research. In any case, land improvements would have such a great potential to augment food production that mass enlightenment could be postponed for centuries before the lack thereof could be blamed for the current situation of the poor.

These views constitute a denial of Malthus’s population apocalypse and reaffirm Chernyshevskii’s confidence in a prosperous future for all people, based on

technical progress, social reform and human development. These were the real requirements for a utopian, but feasible, sustainable future. There would be a stable balance between society and nature, made possible by improving general well-being, not by condemning people to unending poverty, ignorance, and submission.

Chernyshevskii knew he was not alone on this matter. Despite the fact that other advocates of communal ownership, such as Fourier and Pierre-Joseph Proudhon (1809–1865), did not take the time to thoroughly analyze or counter Malthus's theories, they also envisioned a more egalitarian social system as more prone to cause lower human reproduction rates than the prevailing system:

> "(...) it was an astonishing surprise that the communists who came after Malthus began to argue for the need to replace the current economic system with a communist one, on the basis of the very law that Malthus intended to harm communism. Fourier, for example, directly points as one of the main advantages of his system that, with it, without any constraint on the natural inclinations of man, reproduction of people stops at a certain amount, allowing for a high general well-being, whereas, with the current system, despite all the diseases and wars, people reproduce too fast. Proudhon also argues that, by the law of Malthus, the establishment of equality must necessarily lead to a general welfare. We cannot present here the theory of Proudhon or the Fourier system, but it is enough to warn the reader that Mill himself, in the first chapter of the next book [Book II], calls communism a system that, more than any other, can prevent excessive reproduction of people" (1949b [1860–1861], p.262).

The arguments Chernyshevskii used to dismiss Malthusianism fit perfectly into the characterization of his thought as ecological utopian. The reliance on prowess of the natural sciences and the resulting technical progresses; the egalitarian social reform that communalizes land as a natural resource; and human development seen as the enjoyment of life, exercise of reason, freedom to pursue happiness, and satisfaction of basic needs; these are the elements that Chernyshevskii recurrently promotes in his essays and in his novel[68].

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[68] To Grigorian (2016, p.75-76), Vera Pavlovna's fourth dream "shows a predominantly agricultural society which has achieved homogeneous prosperity and harmony with nature thanks to technological advances and an efficient management of resources" and constitutes an "assessment of a society with a reasonably restrained population growth". Chernyshevskii's novel

### 4.4.1 Struggle for existence and mutual aid in Russian social thought

The contrast between Malthus's principle of the struggle for existence between humans and Chernyshevskii's ones of communality, cooperation and improved social relations was the subject of heated discussions among revolutionary Russian thinkers of the second half of the 19th century.

On the one hand, Russians either summarily rejected Malthus for its dreadful individualism, or never really payed too much attention to him[69]. The idea of overpopulation seemed distant to them due to "socio-historical conditions in post-1800 Russia" (Grigorian, 2016, p.70). The country was still in an initial phase of industrialization and market formation; it had a very low population density and a low rate of population growth; its vast territory had a great untapped potential for food production[70]; and social cohesion was particularly valued among Russians as a defense mechanism against the harsh climate[71]. On the other hand, when, in the late 1860s, Darwin mentioned Malthus's concept of struggle for existence as source of inspiration for the development of his theory of evolution – he had read his *Essay* in 1838 (Barlow, 1958) – revolutionary thinkers had to make a statement, either against Darwin, or somehow realigning the theory of evolution with the principles of communal property and cooperation.

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would have deconstructed Malthus's theories, showing an alternative future of controlled population growth, technical progress, harmony with nature, shared wealth, and cooperative individuals who evolve materialy and mentally precisely because of their social cohesion.

[69] The following passage is quite illustrative of Malthus's reputation in revolutionary circles in Russia: "Maltus has become something of a respectable grandmother, with whom it is customary in the family to treat with respect, not listening to what she interprets" (Chernyshevskii, 1949b [1860–1861], p.256).

[70] In his visit to Russia in 1799, Malthus was surprised to see how the soil in Southern Siberia was highly fertile and yet these territories were thinly populated. Instead of seeking the reasons why this result did not conform to his theory, he deducted that there was some kind of social or institutional check that kept agricultural output low and, in turn, restrained population growth. He blamed serfdom and the backwardness of the Russian feudal system (Todes, 1989, p.24).

[71] The animosity of Russians against Malthus's views only partly explains the fierce reproachment of Chernyshevskii to the ideas contained in the *Essay*; his challenge of Malthusianism was more theoretically elaborated, based on his materialism and rational egoism, and his empirical evidences were not from Russia, but from France, North America and even England.

The way to reconcile Darwin with such principles was to break competition into three different types: intraspecific (within one species), interspecific (between different species), and against the external environment. To *narodnik* Petr Alekseevich Bibikov (1832–1875), Malthus's theory only considered the first type, namely the competition between humans. However, intraspecific competition was only a determinant force if the other types of competition did not pose an imminent threat to the competing organisms. He added that, most of the time, interspecific competition was the one of greatest importance. Most population checks were caused by disease stemming from germs or bad harvests due to plagues, droughts, floods, storms etc. Humans could minimize these checks, provoked by interspecific competition or by competition against the external environment, by means of technical progress and social reform. Thus, there would be a lot of room for population growth and general welfare gains before intraspecific competition started to take effect. This would solve the age-old contradiction of political economy in which competition simultaneously augments productivity and poverty. In the example given by Bibikov in his comments to his own translation of Malthus's *Essays*, he considered capitalists and workers as two distinct species. If capitalists excessively oppressed the workers, the competition among the latter would not have significant impacts. Interspecific competition was the key driver: productivity would be hindered and poverty induced. In a scenario of lighter oppression, workers would start competing among themselves for better jobs and positions, increasing productivity and alleviating poverty as a whole. Hence, the implications drawn by Malthus were fallacious; one must actually understand how and when each type of competition acts before devising a social system that maximizes production and minimizes poverty (Todes, 1989).

The separation between interspecific and intraspecific competition would dissociate Darwin's theory of evolution from Malthus's struggle for existence between humans. Private property and market-based competition could again be contested and compared to communal property and cooperative social relations as institutions that fostered the common good and abided by Darwinian evolution theory. Biologist Nikolai Dimitrievich Nozhin (1841–1866) was one of the first Russian intellectuals to accept the precept of natural selection while arguing that "intraspecific relations were normally characterized not by competition, but by

mutual aid" (Todes, 1989, p.31). As a consequence, an increased population would mean more labor capacity and, thus, a higher level of general welfare.

The realignment of Darwinism and the principles of communal property and cooperation was an important achievement for the *narodnik* intellectual movement. Nozhin's views would wield influence over the revolutionaries of the following decades. By the turn of the century, these ideas would constitute the cornerstone of Petr Alekseevich Kropotkin's (1842–1921) influential book *Mutual Aid: A Factor of Evolution* (1902). As Nozhin, Kropotkin agreed with the mechanism of natural selection underlying the evolution of species, but attributed a major role to intraspecific cooperation as a force behind the adaption of successful communities. He also agreed with Chernyshevskii when he, in an essay written shortly before his death (Chernyshevskii, 1987 [1888]), had suggested that, if interspecific competition was a heavy burden to a species, then intraspecific competition would weaken the individuals of this species to the point that evolutionary progress came to a halt.

## 4.5 Chernyshevskii's ecological utopianism projected into the 21st century

Chernyshevskii saw land as a natural resource whose rational use should serve the social ideal of egalitarianism and lead to joy and freedom for all. There is no natural law that prevents this. Technical progress, social reform and human development were the requirements to achieve such an ideal. Malthus's conservative ideology and flawed scientific principles had led to a poor understanding of the relations between man and nature, or, more specifically, between population and land. His application of the principle of the struggle for existence to the social realm was erroneous and deceitful; poverty was rather a problem attributable to an ill-conceived mode of social organization, which prevented that resources were put to use for the satisfaction of human needs, being, instead, usurped to uphold the rights and whims of the elite.

Chernyshevskii's battle against Malthusianism was also intended to discredit soon-to-appear social Darwinists. Despite the fact that Malthus preceded Darwin (*On*

*the Origins of Species* was first published in 1859), the concept of struggle for existence was a common element, and its social implications would provide reactionary conservatives with a powerful argument. Darwin's theory of evolution needed to be realigned with the principles of communal property and cooperation.

Ecological utopianism is the term that refers to the set of ideas presented in this chapter. As seen in Chapter 2, it is also a current of thought within EET that opposes social Darwinism. It also opposes technocracy, since ecological utopians neither see technical progress as a panacea for social inequality, nor display an optimistic view of a future of ilimited abundance of resources. Moral principles are more important than technology for ecological utopians; technical progress is rather a consequence of the rational consciousness of enlightened individuals, who can voluntarily conceive and implement an ideal social system that seeks to fulfill basic human needs and nurture freedom and happiness.

Having assessed the ecological utopianism that is ingrained in *narodnik* thought, the next Chapter brings the discussion to the 21st century. When Martinez-Alier (1987) calls for an ecological neo-narodnism, what is entailed in this worldview? To what extent does it conform to the ecological utopianism of the *narodnik*? What are its main theoretical foundations and policy recommendations for a peasant economy in the 21st century? And, finally, how does it contribute to the contemporary social and environmental challenges of society?

# 5 ECOLOGICAL NEO-NARODNISM AND THE PEASANT ECONOMY IN THE 21ST CENTURY

Elements of *narodnik* thought would, in the last decades of the 19th century, clash with other revolutionary currents within Russian intelligentsia. Disputes among *Narodniki* and Marxists are quite emblematic of how the revolution – either of peasants or of the urban proletariat – was understood, envisioned, and interpreted in different ways. Nevertheless, there were also complementarities, and the influence of narodnism in the underlying intellectual background of the strikes, insurgences, armed conflicts in the beginning of the 20th century and, finally, in the actual seize of power by the Bolsheviks in 1917 is undeniable (see Chapters 3 and 4).

Throughout the 20th century, the intellectual legacy of the *narodniki* would spread to other parts of the world, inspiring socialist peasant movements, especially in the global South, in their resistance against the rapid development and consolidation of the capitalistic mode of production of agricultural commodities, based on large-scale farming and fossil fuels, which endures to this day (Bernstein, 1977; Tepicht, 1975). By the 1960s, in addition to rural flight and its pernicious social consequences, caused by the process of commodification of the peasant economy, there was a growing awareness of environmental damages in planetary scale. Modern industrial agriculture is one of the main culprits of massive biodiversity loss, desertification, soil and water contamination, ocean acidification, chemical pollution, and climate change, among others (Rockström et al., 2009). Such a “metabolic rift” (Foster, 2000) between nature and the economy, and particularly between ecosystems and modern agriculture (Wittman, 2009), would lead to calls for a renewed analysis of the so-called peasant or agrarian question.

One of these initiatives brought *narodnik* thought back to the peasant agenda. Martinez-Alier (1987) conceptualized ecological neo-narodnism – also known as ecopopulism, ecological agrarianism, or environmentalism of the poor – as an alternative ideology to the peasant economy capable of reverting the social and environmental maladies occasioned by industrial agriculture. It is inspired by the

ecological utopian current of the EET of the 1880s–1930s period (see Chapter 2), combining the precepts of scientific rationality with anti-Promethean and egalitarian views.

> "(…) [U]niversal egalitarian ecological utopianism is one 'appropriate ideology' for the poor people of the world (against both the ideologies of 'waiting for economic growth while preserving inequality' and 'to each country, its adaptive, appropriate technology'). Though it is an ideology which could be called 'ecological neo-narodism', it can find much support in the tradition of rational-empiricist study of human ecology" (Martinez-Alier, 1987, p.18).

These rational-empiricist studies of human ecology would be able to assess scarcity in terms of energy and materials. Utopian thought would serve as a way to unveil, in more specific terms, the purposes of humankind. If the resources available to us and our objectives are clearly identified, it would then be possible to determine how to distribute such resources, intra- and intergenerationally, so that all people can live happily within Earth's biophysical limits.

In particular, Martinez-Alier (1987) emphasizes the need for a renaissance of narodnism in developing countries, as the redemption of land in favor of landless peasants or smallholding farmers would contribute to a more sustainable ecological balance between agricultural production and ecosystems, as well as alleviate social inequality and other negative effects of commodification processes in rural areas. The empirical findings of social energetics lead to believe that a wide substitution of industrial with peasant modes of agricultural production would not imply the inability to feed growing populations. Hunger is rather a social than an ecological problem (e.g. migration restrictions, food waste, energy-intensive consumption patterns, and income inequality), and peasant agriculture is, in fact, more efficient than industrial agriculture from an energetic perspective[72], given their relatively higher independence from fossil fuels as inputs to the production process (Pimentel et al., 1973). Moreover, the exhaustible character of carbon-

[72] Such a result contrasts with those based on a monetary perspective, in which agricultural productivity is higher in industrial farms, mostly due to underpriced inputs (e.g. oil and chemical products), which, in turn, do not have their costs internalized or are subject of an imposed social discount of future demand (Martinez-Alier, 1987).

based agricultural production hints at a reinvigorated role of labor-intensive farming in the future (Veermer, 1976).

Ecological neo-narodnism is not to be seen as a reaction to the post-modern discredit of science and social progress, or as a local resistance against capitalist expansion, but as the result of a rational analysis of the obvious contradictions between the precepts of human ecology and capitalism. Ecological neo-narodnism, therefore, aims to provide a universal ideological platform in which different cultures can perpetuate economic reproduction through the adoption of socially and environmentally sustainable modes of social organization (Martinez-Alier & Schlüpmann, 1991, p.316).

As a programmatic concept, ecological neo-narodnism links the empirical evidences arising from studies in social energetics (see Chapter 2) to the construction of theories and formulation of public policies that reflect the need for a social organization based on communities as the unit of social life, and on an egalitarian distribution of natural resources. Such a concept adds to 19$^{th}$-century narodnism a stronger sense that economic activity must be regarded as biophysical flows and stocks of energy and matter, a notion that might prevent the systemic destruction of natural processes that are indispensable for the maintenance of economic reproduction. Despite this very important difference (which corresponds to the adjective “ecological” in the expression “ecological neo-narodnism”), the ideas of *narodnik* thinkers such as Chernyshevskii’s, if retrospectively assessed, do not seem to have become outdated in the last *circa* 150 years (see Chapter 4). Their ecological utopianism, as those of early Soviet ecologists (see Chapter 3), or of the “Other Austrian Economics” (see Chapter 2), remains a viable present-day alternative to tackle worsening social and environmental problems.

Another novel feature of ecological neo-narodnism is that it transcends the question of land ownership. It deals with the distribution of every natural resource that is important to satisfy basic human needs. Martinez-Alier (1987, p.235) puts forth the example of oil, claiming that a part of its reserves should be destined to the peasant economy, so that the more arduous tasks in agricultural production are performed by machinery and not human labor. Interestingly, this suggestion

resembles Chernyshevskii's utopian views. In Vera Pavlovna's fourth dream (see Chapter 4), he depicts the use of machines in the fields, while peasants sing and laugh while undertaking less painful chores. The underlying message is that the available material means and technology should primarily serve the greater good, according to the stipulated purposes of human existence.

The limited character of natural bounty is yet another point that is more openly present in ecological neo-narodnism than in its intellectual sources. In the 19th century, the scale of natural processes were immensely larger than that of economic processes, making it difficult or irrelevant to advocate for any clear limits to the growth of the human economy. Conversely, natural and economic processes currently present the same order of magnitude, which is a result of over a hundred years of relentless economic growth, with unpredictable and potentially irreversible consequences for the habitability of the planet by humans. This distinction justifies an emphasis on redistribution rather than on growth of the productive forces. Energy and material flows into social systems are to be rearranged, not increased; if anything, these flows might need to decrease if future generations are to have their basic needs fulfilled (Rockström et al., 2009).

The next section explores in detail the ecological economic theories that can be applied to the peasant economy according to the ideology of ecological neo-narodnism. The assessment of such an ideology is divided into the perspectives of the fields of political economy and political ecology, and existing peasant movements are mentioned as the manifestation of such a worldview. Finally, the potential contributions of ecological neo-narodnism to worldwide social and environmental challenges are discussed.

## 5.1 Ecological economic theory and the peasant economy

Ecological economic theories are those arising from assumptions regarding the dynamics of energy and material transformations in economic processes, and based on empirical evidence obtained from comprehensive research in social energetics. Such a biophysical approach to the social sciences, and to economic science in particular, entails the need to assess the human economy by means of

energy and material flow accounting, i.e., the accounting of the flows (and stocks) of energy and matter that are relevant to concrete production, distribution, and consumption processes. Energy and material flow accounting poses as empirical evidence that supports the deduction of economic theories and the recommendation of public policies. On the other hand, the different manners in which such biophysical transformations may sustain social provisioning and be appropriated by different social groups lead to a diverse range of ecological economic theories. Therefore, there is also a normative aspect to such theories, which involves moral choices related to resource distribution, social ideals, and policy-making (see Chapter 2).

To Martinez-Alier (1995), the normative aspects of EET associated with ecological neo-narodnism can be analyzed within at least two disciplinary fields of knowledge: political economy, understood as “the study of the economics of distributional conflicts”, and political ecology, “the study of the ecology of distributional conflicts” (p.146). The ideology of ecological neo-narodnism would merge the objects of these scientific fields at the ontological and epistemological levels, even though their emphases and rationales are not the same. Moreover, the implications of this merge for interdisciplinary research are wide in scope, pertaining to the environmental social sciences as a whole (see fn. 14). When applied to the peasant question, Martinez-Alier translates these normative aspects as a “theoretical connection between smallholding [peasant agriculture] and ecology [that] must come through a theory of ‘peasant resistance’ and ‘moral economy’”. Class struggle is an element of vital importance to understand how peasants can resist exploitation or competition using the natural resources that are available to them and maintaining their traditional social relations and moral principles. The universality of class struggle acts as a unifying element, and neo-narodnism is, in this sense, a term that is comparable, for example, to neo-Zapatism (Toledo, 1999).

The expressions “ecological agrarianism” and “environmentalism of the poor” more adequately convey such a universality. Also, since the term “ecological neo-narodnism” calls for a historical knowledge that is not always readily available (the present work might contribute in this regard), Martinez-Alier would later choose to

adopt “environmentalism of the poor” as the main catchword for the same set of ideas (Martinez-Alier, 2002). However, he did not drop altogether the term alluding to its *narodnik* lineage, as will be the case here.

### 5.1.1 Ecological neo-narodnism as political economy

The political economy of ecological neo-narodnism focuses on the peasantry as an agent capable to avert the indiscriminate penetration of market systems and, hence, to lead the transition from capitalism to socialism (Martinez-Alier, 1989). Martinez-Alier’s views on the peasant economy are based on Podolinskii’s social energetics (Martinez-Alier & Naredo, 1982), the *narodnik* (and also Marxist) pioneer of EET (see Chapter 2), and the agricultural economics of the organization-production school made famous by Chaianov (see Chapter 3). Podolinskii’s attempt to conflate energetics and Marxism is one of the issues discussed by Martinez-Alier, who is, at first, skeptical:

> “our conclusion is that Marxism would have to be much revised since there are epistemological obstacles (the use of categories from Political Economy, such as 'production', 'labour-value', 'capital') and ideological obstacles (the vision of a two-stage transition to communist abundance and equality)” (Martinez-Alier & Naredo, 1982, p.207).

Martinez-Alier (1989) criticized how Marxism is closer to an economicist than to a materialist-energetic approach. In addition, he opposed the emphasis on economic growth – rather than on redistribution – of Marxists and development economists (Martinez-Alier, 1987). Conversely, more recent literature on eco-socialism and eco-Marxism would reconnect Marxism and ecological economics (Foster, 2000; Burkett, 2009; Löwy, 2015). Also, some interpretations of Marxism were, to Martinez-Alier, quite representative of ecological neo-narodnism, such as José Carlos Mariátegui’s (1894–1930) combination of materialist and romanticist elements in his argument in favor of a collective organization of indigenous peasants for the success of socialism in Peru (Martinez-Alier, 1989).

Martinez-Alier (1997) focuses on Chaianov’s views on the peasant economy as inspiration for his ecological neo-narodnism. Chaianov would have differed from liberals and orthodox Marxists in his “praise of peasant economic rationality, in the

case of high population density, [which] contains arguments based as much in economic efficiency as in equity" (p.227)[73]. He argued that peasant households constituted a distinctive form of social organization, whose economic rationality did not abide by the principles of a capitalist enterprise. These ideas had been put forth by *narodnik* economists such as Vorontsov and Danielson, who believed that, as a non-capitalist institution of high efficiency, the Russian commune had a bright future in socialist economies, and its existence and expansion should be ensured by a strong state. It was a viable alternative to the social problems of a growing industrial agriculture, as it would be conceived and pursued either in Eastern or Western economies. This opposition to industrial agriculture and its social and environmental implications would be the main thread connecting 19th-century narodnism and neo-narodnism – ecological or not – of the 20th century.

Chaianov's economic theory was anchored on statistical evidence. It included correlations between sown area, family size, and household consumption demands, which would inform how production would take place in a determined holding, based on the assumption that peasants behaved according to an equilibrium between the toil of labor and satisfaction of consumer demands. Such an equilibrium corresponded to a level of self-exploitation within the rural household, which varied from family to family, according to objective (e.g. composition, size, or ages of family members) and subjective (values, relationship to the land, traditions, or technical knowledge) factors. Furthermore, peasants could, occasionally, act contrarily to the precepts of neoclassical economics, failing, for instance, to seek profit maximization. This result might also apply to other social groups facing a choice between the drudgery of labor and the benefits of consumption (Sivakumar, 2001).

The demise of the peasant economy to the benefit of industrial agriculture would be the result of the imperative of productivity gains and of a low income-elasticity of demand for agricultural products, which meant that part of the rural population

[73] The position of Marx himself did not directly antagonize the traditional peasant communes as an institution with legitimate powers to conduct the transition to socialism in Russia, according to his 1881 letter to *narodnik* Vera Zasulich.

would inevitably lose their roles and be forced to move into urban areas (Martinez-Alier, 1997). However, Chaianov realized that peasants could more freely adapt to scenarios of high population densities, rearranging household labor in ways that capitalistic social relations would not easily accomplish. In this sense, in a setting of growing population densities, peasants would intensify production. They would not be tied to wage-labor relations, having the flexibility to create new sorts of tenancy contracts (such as sharecropping) which encourage higher marginal productivity by linking personal efforts to earnings. Conversely, these alleged advantages of the peasant economy would bring the above-mentioned notion of "self-exploitation" within rural households, which would be fiercely criticized by Marxists as oblivious to class struggle. Chaianov's labor-consumer balances and correlations between household and farm sizes led to a "convincing application of marginalist economics to non-capitalist institutions (family labour, and customary needs satisfied by self-provisioning and by the market)" (Martinez-Alier, 1997, p.228).

Martinez-Alier (1997) acknowledged Georgescu-Roegen as another important agrarian economist of *narodnik* inclination. A scholar of Romanian descent, Georgescu-Roegen and his intellectual contemporaries (e.g. sociologist Dmitrie Gusti [1880–1955]) had already been acquainted with *narodnik* agrarian economics in the 1930s, whereas Chaianov's work would only become known to most Western economists in the 1960s. In his essay *Economic Theory and Agrarian Economics*, Georgescu-Roegen (1960) had not yet formulated his biophysical approach to its full extent, but his pro-peasantry economic analysis and questioning of the rationality of market systems were visibly of *narodnik* character. He called Chaianov "one of the most praiseworthy Russian agrarians" (p.10), and restated the importance given by Chaianov to the development of a "theory of the economic behavior of the peasant" (p.11). This essay would be the germ of his EET of the 1970s, which combined a utility theory that stressed the role of social institutions, Chaianovian agrarian economics, and social energetics.

Georgescu-Roegen's 1960 essay would face intense criticism, as had often happened to works that focused on the peasantry as an important economic issue. Critics stated that neo-*narodnik* economics naively portrayed the peasantry as an

economically undifferentiated or homogeneous class, with an idealized view of the ability, stability, and efficiency of peasants in their competition against industrial agriculture. Peasant and industrial farms would have different objectives; the former, subsistence, and the latter, profits. Household labor and rural wage-labor implied completely different conditions of production, which were connected through markets. Furthermore, industrial agriculture would not thrive if it did not possess higher yields and surpluses per unit area. The arguments of the neo-*narodniki* were, thus, fallacious (Patnaik, 1979). In his rejoinder to Patnaik, Georgescu-Roegen (1981) reaffirmed that his views were accurate in many historical settings, mentioning, for instance, Soviet data according to which peasant farms could produce more efficiently, both in quantity and quality, than the collective Soviet farms.

Paitnak's problem with the pro-peasantry economics of the neo-narodnists was, in fact, not the evidence on their ability, stability, or efficiency, especially in societies with high population densities. In his reply to Georgescu-Roegen, he explained his criticism as follows:

> Our concern was with the interpretation of this fact [higher efficiency of peasant farming in terms of yield per unit area] by the neo-Populists in a one-sided and apologetic manner, by taking the output value per unit area as the only index of 'efficiency', locating it within a theory which denies the existence of class differences and exploitative relations within the peasantry, and rationalising the objectively-existing distress of small peasants in terms of subjective models of 'peasant equilibrium' (Patnaik, 1981, p.244).

Patnaik's main concern was the neglect of the consequences of "self-exploitation" within household labor in neo-*narodnik* economics. High-yield peasant farms would often be led by starving and overworked families. In this sense, the exploitative wage-labor relations of capitalist economics were also present in privately-owned, small peasant farms. In socialist economies, the enduring presence of smallholders was a result of organizational and other institutional problems of the planned transition into collective industrial farms, and not the influence of their abilities and efficiency. To Patnaik (1981, p.245), "it is only under socialist planning that the family farm can become viable and a transitional form to socialised production in agriculture [be obtained]".

Patnaik seems to dismiss the historical relevance of peasant farms or its role to the future of agriculture, as well as the institutional views held by Chaianov and Georgescu-Roegen. He acknowledges the legitimacy of the peasantry at best as a transitional form, although conceding that the organization of rural communes rises the real income of rural households "while the private plot provides the extra bit of variety in diet and extra income for small luxuries" (Patnaik, 1981, p.245). His reproach toward the abstraction level of neo-*narodnik* economics and their alleged negligence of social differentiation and class struggle is, however, partly justified. Pro-peasantry economic theories of Chaianovian character, i.e. marginalist theories[74] in non-capitalistic settings, entail the application of equilibrium models to the peasant economy, and, in this sense, can be as misguided as the bulk of neoclassical economic theories. The idealization of the peasant household farm as the unitary economic agent can be interpreted as an attempt to forge a way to apply the neoclassical approach to the peasant question. On the other hand, the institutional and organizational aspects of Chaianov's economics, as well as his support for the creation of peasant cooperatives, cannot be ignored. To Sivakumar (2001), Chaianov's macroeconomics was proof that depicting him as a marginalist was more a rhetorical argument than an assessment based on theory.

> "As regards his macro-level preoccupations, nothing could be less marginalist than Chayanov's model. Consider, for example, the theoretically eclectic collection of concepts that influence the resource allocation process in Chayanov's analysis: stochastic or chance factors, surplus-value of merchant capitalists, linkage between product and input markets, co-operativized decision making, state regulation of markets, plus demographic considerations and the dynamics of land–man ratios" (Sivakumar, 2001, p.40).

The term "neo-populism" used by Patnaik (Georgescu-Roegen preferred "agrarianism"; here, "neo-narodnism" is used) relates to Chaianovian economics. It has a very different meaning than the term "narodnism", as presented in previous chapters. Both relentlessly supported the peasant economy, cooperatives, and asked similar questions, e.g. how internally differentiated or egalitarian the

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[74] Marginalism is adopted here in a wide sense, corresponding to theories in which efficient economic activity is linked to the equilibrium between revenues and costs at the margin.

*obshchina* was. Otherwise, they adopted different assumptions, theories, and methodologies. Patnaik (1981) asserted that “neoclassical ideas are nothing if not anticlassical” (p.246), but he did not suggest, nor should he, that Chaianovian neo-populism was, in fact, anti-populist or anti-*narodnik*. Nevertheless, one must acknowledge that the ideas of Chernyshevskii and of other *narodniki* of the 19th century have little in common with the marginalism of the neo-populist economists of the 20th century.

Ecological neo-narodnism, as proposed here, would ideally be closer to a renewal of the ideas of the original *narodnik* intelligentsia, namely their ecological utopianism, to which is added the modern biophysical approach of EET. As was shown in Chapter 4, particularly in Chernyshevskii’s rebuttal of Malthus’s political economy, the *narodniki* assessed the peasant economy using the *obshchina* as unit of analysis, and not the rural household. Communal ownership, production, and consumption were the economic categories on which the political economy of Chernyshevskii was based, and cooperation (or mutual aid, according to Kropotkin’s terminology) was a fundamental element to understand the economic behavior of peasants.

Martinez-Alier (1997), however, sided with Georgescu-Roegen against Patnaik, which is understandable, given the ideological split between socialists who supported the smallholders and those in favor of the large-scale collectivization of agriculture. Moreover, by the 1970s, environmental issues could not be overlooked, and Patnaik did not bother to analyze the comparative advantages, in ecological terms, of peasant farms over industrial ones. But these arguments do not excuse Martinez-Alier from the observation that ecological neo-narodnism, as an ideology that fosters the development of an ecologically sound peasant economy in the 21st century, as he states it aims to be, should not be viewed as the narrow application of a sustainable Chaianovian economics, but as the embodiment of the ecological utopianism of the *narodnik* intelligentsia, coupled with a strong biophysical approach to the economy, as professed by modern ecological economists (see Chapter 2).

The growing importance of environmental challenges at planetary level is the novel element that calls for a “greening” of the debate on the peasant economy

and reinvigorates arguments in favor of ecological neo-narodnism. Human ecology is crucial to the understanding of peasant agriculture, whose mode of organization of production relies less on markets and their energy-intensive inputs, and more on cheap and energetically efficient agroecological techniques. Such an organization would favor the maintenance of the services provided by the soil, watersheds, biodiversity, and other types of natural capital, while allowing for the maintenance of the conditions of production of the farm without the need for greater amounts of monetary capital.

Conversely, farm sizes and the rationality of peasants (and the ensuing agricultural practices and techniques) toward their environment are not necessarily in agreement with ecological precepts. Ecologically sound behavior depends on the level of peasants' involvement with the market, as prices do not reflect biophysical reality, and on their capacity to secure their own livelihoods, as extreme poverty might lead to abuse of the services provided by nature (Martinez-Alier, 1995).

There are important economic implications of the fact that peasant agriculture is more energy-efficient than industrial agriculture. Given the exhaustible nature of fossil fuels and the associated negative externalities of their use, it would be reasonable to assume a scenario of increasing energy prices in the long-run. Does it mean that peasant farms running on a solar energy budget are bound to gain competitivity in this new scenario? Martinez-Alier (1995) contends that the disconnection between prices and environmental costs of economic production casts doubt upon this assumption. "The prices of the economy are embedded in the social perception and valuation of externalities and opportunity costs for future generations" (p.144); they can often go in an opposite direction from biophysical indicators. However, with the introduction of "ecologically-corrected prices", by means of a political process, agroecological peasant farms could become the cornerstone of a sustainable food production system for a densely populated planet. Without such a correction to the current economic system, the adaptation skills of peasants praised by Chaianov would be limited, as well as the positive impact of their environment-friendly energetics.

If, on the one hand, even such “ecologically-corrected prices” might not be enough to promote deeper changes in the mode of social organization in rural areas, on the other hand, peasants are not to disappear without them. Martinez-Alier (1995) gives the following reasons: household labor is versatile and cheap; energy prices will likely have some positive effect on the competitiveness of peasant farms; population densities tend to grow each year; and social awareness toward the broken relationship between humans and nature is escalating.

Martinez-Alier’s political economy of ecological neo-narodnism is, in brief, an ecologically adjusted approach to Chaianovian economics, much in the same way as proposed earlier by Georgescu-Roegen. His works on this subject lack a utopian element[75] and do not call for a more radical overhaul of the current economic rationality, as was the case with Chernyshevskii’s anti-Malthusian ecological utopianism. Communality and cooperation are not sufficiently emphasized, despite their potential to tackle environmental challenges that affect all people (e.g. climate change), a situation one could deem as a reversed “tragedy of the commons”. Communality and cooperation are adequate concepts to interpret economic behavior toward common goods as much as toward common problems. However, planetary-level environmental peril cannot be addressed by means of enclosures, as it has been argued and done for common goods. A paradigmatic shift is needed, a new worldview pushing for social change, based on the concepts of communality and cooperation at the local, regional, and global levels. Such a shift would entail a vision of the peasant economy not in terms of the aggregate behavior of independent smallholders or households, but of structured communities with emergent properties pertaining their collective rationality and organization.

[75] Martinez-Alier (1987) is an exception to this claim, but it does not address in detail the political economy of ecological neo-narodnism.

### 5.1.2 Ecological neo-narodnism as political ecology

As “the study of the ecology of distributional conflicts” (Martinez-Alier, 1995, p.146), political ecology analyzes different forms of appropriation and use of natural resources and sinks[76] for the purposes of social provisioning. A field that first gained ground in the late 1970s, especially through the initiatives of geographers and anthropologists, it focuses on power inequality as a factor conditioning the access to such resources and sinks and the distribution of the benefits and burdens associated with them. Power is, therefore, a key concept to understand how humans interact with nature and with each other. Ecological analyses based on the natural sciences, such as assessments of energy and material flows between environmental and social systems, would not be sufficient to understand the dynamics of cultural development. Hence, political ecologists reject energetic reductionist views (see Chapter 2) and strive to understand emerging social phenomena in their own terms, before analyzing them jointly with knowledge from the natural sciences. Moral issues, normative debates, and social ideals are, in this sense, as important as social energetics or ecosystem studies.

> “The determinants of ecological distribution are in some respects natural (climate, topography, rainfall patterns, minerals, soil quality and so on). They are clearly, in other respects, social, cultural, economic, political and technological” (Martinez-Alier, 2002, p.73).

Only a small fraction of the use of natural resources is tied to the satisfaction of basic human needs. Accordingly, the destination of most natural resources appropriated by humans cannot be explained by physiological aspects of human ecology in the same way that it is by those of plant or animal ecology. Social, cultural, economic, political, and technological issues may lead to radically different institutional settings, in which the use of natural resources are either sustainable or not, and their distribution more egalitarian or not (Martinez-Alier, 1988).

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[76] The concept of natural sink relates to the capability of natural processes to absorb the impacts caused by economic processes, such as pollution, waste, heat, radiation, etc.

The concept of environmental justice is at the core of political ecology. It analyzes the connections between power inequality and environmental degradation, as well as the social conflicts arising from ecologically unequal distributions or exchanges. However, it is more commonly referred to as a movement within environmentalism, a third current that would challenge both the advocates of radical preservationism and those in favor of a utilitarian conservationism based on efficiency gains (Martinez-Alier, 2002, p.vii). Its logic lies on the environmental benefits of a more egalitarian distribution of resources aiming the satisfaction of basic human needs, and contrasts with conservation policies based on national parks and other types of protected areas that segregate nature from humans. It also opposes theories in favor of ecological modernization[77] as the solution to environmental problems, as professed by top-down approaches to the notion of sustainable development and which, in many cases, go against the interests of poor and indigenous populations (Leff, 2004).

This third current entails a strong cultural dimension to the environmentalist movement, summoning communities to take charge of the management of natural resources while respecting their cultural identities. It envisions the conception of new modes of production, distribution, and consumption based on a renewed ethical platform that reproduces the cultural heritage of such communities, thereby organically fashioning a new environmental rationality (Leff, 2004, p.364).

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[77] Advocates of ecological modernization argue that environmental challenges might be successfully overcome through a "green" reform of the current economic system (Mol, 2002). Unwavering economic development would be the best option for escaping ecological crises while fostering employment, given the power of technological innovations to reduce resource use and waste generation (Andersen & Massa, 2000; Fisher & Freudenburg, 2001). It "hypothesizes that while the most challenging environmental problems of this century and the next have (or will have) been caused by modernization and industrialization, their solutions must necessary [sic] lie in more – rather than less – modernization and 'superindustrialization'" (Buttel, 2000, p. 61). In such a view, endless economic growth would be possible by means of the dematerialization of the economy. Constant technological innovations would allow for growth without significant rises in flows of matter and energy. Therefore, a sustainable future could be achieved by means of new "green" business opportunities in response to a higher demand for ecologically competitive products. Such a cornucopian view rests on controversial claims on the biophysical decoupling of the economy, focusing on relative efficiency gains; disregarding absolute levels of material and energy use by humans; and making the case for further unlimited and unequal appropriation of resources.

The environmental justice movement is composed of many grass-roots organizations that question the weight of political and economic power in decision-making processes involving the appropriation and use of natural resources and sinks. Such organizations stand up against a myriad of abuses over land, air, and water. They are formed by and act in favor of vulnerable populations (typically the poor or indigenous communities), standing up against exhaustion of natural resources and reckless disposal of waste and pollutants by private corporations (Martinez-Alier, 2012).

With respect to the peasant economy, the environmental justice movement tackles land ownership and use as a pivotal matter for securing the livelihood of smallholders and agroecological communities. Also, peasants have a history of coevolution with their environment, constituting more sustainable and adaptable modes of social organization. Their traditional agricultural techniques have created a variety of new crops while protecting biodiversity and maintaining water and chemical cycles. Thus, social and ecological arguments are joint, “implying a link between peasant resistance movements and the ecological critique of both agricultural modernization and ‘scientific’ forestry” (Martinez-Alier, 2002, p.13).

Ecological neo-narodnism would be an ideology for the environmental justice movement. The foundation on ecological science, the awareness of the limited character of natural bounty, and the egalitarian social ideal are features that thrust *narodnik* thought into the 21$^{st}$ century, restoring the *obshchina* as an institution capable to address contemporary challenges of social and ecological order. This movement brings with itself the *narodnik* utopia of a social system based on communal values and cooperation, which would also be embedded in the rationality and behavior of the agroecological peasantry of today.

While Martinez-Alier (2011, p.146) sees ecological neo-narodnism as “in essence a pro-peasant movement that uses arguments from ecological economics and other sustainability sciences”, the political language of power relations is emphasized. The solution to environmental and social problems would not be plainly technical or economical, but rather political, through the struggle of grass-roots movements such as those seeking environmental justice (Leff, 1986; Martinez-Alier, 1989).

> "Strong, rational arguments can be brought against both so-called economic rationality and ecological managerialism. Meanwhile, at present, there is a big struggle, fought with unequal means and unequal opportunities, to set the environmental-economic agenda in the world, especially to determine which are the important issues. This fight is not yet about which decisions to take; it is rather about inclusions and exclusions of topics to be discussed. Who should set the environmental-economic agenda? (…) [A]ll attempt to direct the ecological debate in particular directions, and they have unequal access to the media and unequal power and money" (Martinez-Alier, 1988, p.118).

## 5.2 Peasant movements

Pro-peasant social movements representing the tenets of environmental justice gained ground in the 1960s, alongside other initiatives of left-wing ecologism, such as the pacifist communalism of the American counterculture movement, or the anarchist communalism professed by social ecologist Murray Bookchin (1921–2006). The oil crises of the 1970s added momentum to these undertakings, as well as the growing awareness within academic circles of mounting environmental havoc caused by the prevailing economic rationality, among which Club of Rome's *Limits to Growth* (Meadows et al., 1972), Rachel Carson's *Silent Spring* (Carson, 1964), and other landmark works of economists with an interest in the biophysical approach to economics[78], such as Georgescu-Roegen, Boulding, and Daly. Although the first actions were seen in Europe and America, by the 1980s environmental justice movements had spread across the global South, mainly in India, parts of Africa and Latin America, in association with the issue of unequal ecological exchanges between North and South (Martinez-Alier, 1987).

The formation of globally integrated production chains and underlying international power relations revealed how the basically unidirectional flow of commodity exports from South to North led to a relentless expansion of industrial agriculture and its carbon-based high monetary yields. Such imbalance in energy and matter transferences was combined with deteriorated terms of trade, leaving poor

[78] These economists have been associated with the appearance of "thermoeconomics", a term coined in the beginning of the 1960s by American engineer and thermodynamicist Myron Tribus (El-Sayed, 2003).

countries indebted and in social turmoil (Altvater, 1992). Such transnational economic dynamics would lead to an overly simplistic view, in which environmental harm was caused by wealth in the North and poverty in the South. This conclusion would easily and misguidedly be appropriated by discourses related to ecological modernization, which succeeded in their mission to environmentally justify the need for economic growth and more “green” business opportunities. The response in the South would come in the form of social movements of all sorts, among them peasants calling for environmental justice.

In India, environmentalist movements have been addressing the issue of social justice at least since the 1970s, criticizing the existence of differential access to natural resources, development-induced displacement, and gender inequality. Rajan (2014) traces the intellectual origins of such movements to Indira Gandhi’s stance in favor of a compromise between the environment, economic development and justice, to be achieved by focusing on the improvement of the lives and livelihoods of the vulnerable masses. However, her emphasis on the role of appropriate technologies and association between poverty and environmental damage were not quite aligned with the concept of environmental justice set forth here. For instance, the *Chipko* movement of the 1970s, in which rural women from Northern India would hug trees to prevent them from being cut-down, was fiercely opposed to Western models of technological development and social change. Their struggle can be more clearly related to Gandhian economic philosophy and particularly to the “economy of permanence” of Kumarappa (1945), which centered economic analysis on small, democratic communities and how to make them self-sufficient in terms of basic human needs, through subsistence agriculture and craftsmanship. Unlike the industrial development of Western societies, the economy of permanence would reflect nature’s perennial capacity to sustain life. It takes into consideration environmental vulnerabilities, human creativity, spiritual values, and altruistic behavior (Corazza & Victus, 2015).

In Latin America, environmental justice movements grew in the 1990s, reclaiming the right of indigenous groups or rural workers over arable land. In Mexico, Zapatists fought for autonomous and democratic management of the natural resources of their territories. In Brazil, the Rural Landless Workers’ Movement

called for land reform in favor of smallholders. In Andean countries, peasants reminisce about a biologically diverse and ecologically sound pre-Hispanic agriculture while organizing themselves around what Martinez-Alier (1987, p.244) calls “retrospective utopianism”. In a more institutionalized setting, the *Buen Vivir*[79] movement in Ecuador is at once a social movement and political philosophy characterized by different views and values regarding concepts such as human development and welfare, which focus on community life and harmonious man-nature relationships. According to the worldview of *Buen Vivir*, nature would not only present intrinsic value, but bear rights of its own. Environmental disruption arising from the creation of artificial needs, for instance, would breach the rights of *Pachamama* (“Mother Earth” or “Mother Nature”) (Zaffaroni, 2011). Economic activity should support and be supported by elements such as solidarity, local autonomy, regenerative use of resources and the right of all peoples and communities to a self-assessed, dignified existence. Furthermore, *Buen Vivir* advocates propose that social and economic regulations should be performed at the community level, reducing market and state power over individual and collective choices. Acosta (2015) acknowledges the need to confront power relations that are strongly unfavorable to those represented by *Buen Vivir*. The challenge to transform reality goes way beyond discourse implementation, even though some steps have already been taken in this direction, as illustrated by the incorporation of *Buen Vivir* as a constitutional principle in Ecuador[80].

The above-mentioned examples of environmental justice movements conform to a culturalist approach to the peasant question. As affirmed by Brass (2002), agrarian movements all over the world have changed profoundly in the last two decades of the 20th century, shifting focus toward “postmodern populist objectives”. Peasant movements would be gradually becoming less concerned with seizing control of

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[79] *Buen Vivir* is the Spanish expression adapted from the Quechuan *Sumak Kawsay*, meaning “to live in plenitude”, a notion inspired by old Andean and Amazonian traditions.

[80] Having its economy based on commodity exports, Ecuador still struggles to remain on a path toward the consolidation of the principles and practices of *Buen Vivir*, overcoming the power of influential groups linked to large-scale extractive projects, which typically lead to social and environmental losses (Villalba-Eguiluz & Etxano, 2017).

state power or reforming social and economic systems, and more interested in revealing their identities, values, and traditions, which are usually ecologically sustainable and at odds with the logic of markets.

> "From the Balkans to the erstwhile Soviet Union, the break-up of the existing state has resulted in a process of political decentralization not of the state itself but much rather of national identity, which has in turn given rise to claims to nationhood/statehood on the basis of ever-smaller and much older territorial units. In short, a process which involves the reassertion by those claiming to form a 'people' possessing ancient territorial rights, on which the realization of a nation within the boundaries of the state are now increasingly based. (…) More recently, the idea of a culturally-specific state has been advanced by *indigenista* theorists now associated with the application of a postmodern subaltern studies project to the study of Latin American peasants. This view has been supported by, among others, Albó [Xavier Albó Corrons (1939– )] with regard to the Bolivian Aymara, on the grounds that smallholding peasants belonging to that indigenous group had a culture and viable economic organizational forms that were specific to it, and as such constituted a nation that preceded Spanish colonialism" (Brass, 2002, p.20-21).

Petras and Veltmeyer (2001), however, move beyond Brass's culturalist approach and portray contemporary peasant movements in a more powerful shade. The authors acknowledge the significance of the ethnical element, but go beyond to affirm that Latin American peasant movements are an actual force of change. They dismiss the postmodernist approach and argue that such movements constitute a modern platform of criticism to neoliberal dominance, addressing fundamental class issues, shedding light on the capabilities of social systems based on cooperative behavior, and showing a deep understanding of power relations at all levels.

> "The resurgence of peasant and rural movements in Latin America is built around the combination of on the one hand traditional forms of cohesion, based on kinship, community and in many cases class and ethnic identity, and on the other the adaptation of modern goals and techniques, coupled with a strategic understanding of the levers of power in the national and international system, all of which are allied to the quest for an alternative form of development: family smallholding or community-based collectivism in some cases, socialist or pro-socialist (co-operative) in others" (Petras & Veltmeyer, 2001, p.111).

The ethnical element, translated as the search for identity and values in old traditions, is an important factor, but it does not suffice to grasp their *raison d'être.*

Peasant movements seek systemic change, not mere survival of the old ways. They are equipped to confront capitalist institutions with up-to-date data and knowledge. Their egalitarian or socialist discourses are accompanied by propositions and alternatives related to resource management, economic development, human rights, freedom, and justice, always within the context of systemic change. In the face of environmental peril at planetary level, the ecological argument might be a game-changing reinforcement to the discourses and alternatives put forth by peasant movements of the 21st century.

The internationalization process of such movements hint toward their goals of systemic change, as opposed to mere survival. The International Peasant's Movement *La Via Campesina*[81] attests to this outward look. It claims to be an autonomous, pluralist, and non-partisan international initiative bringing together local and regional peasant movements in defense of food sovereignty as means to safeguard social justice and environmental health. Martinez-Alier (2011) sees *La Via Campesina* as the embodiment of ecological neo-narodnism, not least due to the emphasis given in their discourses to the energetic efficiency of peasant agriculture and, hence, its ability, in general, to provide for humankind while minimizing environmental impacts. This is a fine example of the political application of ecological economic principles, which appears as a social demand, and the ensuing feedback from activism to the development of ecological economic science.

## 5.3 Contributions to current social and environmental challenges

Theory and practice inspired by ecological neo-narodnism constitute an alternative to overcome the social and environmental challenges of the 21st century, i.e. tackling inequality and complying with planetary boundaries imposed onto human

[81] *La Via Campesina* was founded in 1993. It now comprises 182 local and national organisations in 81 countries from Africa, Asia, Europe and the Americas, representing ca. 200 million farmers (https://viacampesina.org/en/, accessed on January 28th 2019).

activity[82]. The proposed systemic change is based on principles of communality and cooperation, as well as on the harmonious coevolution of humans and nature, preserving the balance between natural and economic processes and the survival of humankind itself. It refers to a paradigmatic shift, in which social justice dictates that minimum living standards should be granted for all, while ecological thresholds enforce a ceiling to the scale of economic processes vis-à-vis those of natural processes.

Therefore, ecological neo-narodnism would also be about developed countries restraining their own activity levels, releasing scarce resources for more vulnerable territories to have their most basic needs satisfied. In this sense, there would be a conflict between social and ecological targets. The former proposes a lower and the latter an upper limit to the scale of a given economy. These would correspond respectively to a social foundation and an ecological ceiling, as per Raworth's (2017) concept of "doughnut economics". Public policies should aim for the interval between these two boundaries, as meeting demands for social justice is essential to ensure public support for environmental issues; in turn, the observance of ecological thresholds would prevent large-scale social degradation as a result from halting ecosystem services. Food and energy security represent, in this sense, key aspects of "socially inclusionary and environmentally sound development strategies" (Sachs, 2015, p. 13). The current global imbalances in food (Patel, 2012) and energy (Arto et al., 2016) consumption demonstrate how far humankind still is from becoming a sustainable society, and how a systemic change might indeed be the solution.

The metabolic rift between economic and natural processes is particularly evident in industrial agriculture. The historical relations between society and nature have been dramatically altered by agricultural practices. Carbon-based industrial agriculture led to a metabolic rupture between the flows of energy and materials in natural and social systems, not to mention rural flight and qualitative

[82] According to Rockström et al. (2009), planetary boundaries are climate change, ocean acidification, stratospheric ozone depletion, nitrogen and phosphorus cycles, global freshwater use, change in land use, biodiversity loss, atmospheric aerosol loading, and chemical pollution.

environmental degradation. Peasant movements would be imbued with the task of overcoming the contradictions of current socioecological conditions in rural areas, rekindling agrarian identity and redeeming agroecological traditions that conform to biophysical limits while providing humans with their most basic needs (Wittman, 2009). The case of climate change is illustrative:

> "In fact, industrial agriculture is one of the main drivers of climate change, carrying food around the world and imposing monocultures and mechanization and the use of agrochemicals while destroying biodiversity and its ability to capture carbon and 'transforming agriculture from a producer of energy into an energy consumer'. The solutions that Via Campesina puts forward are small scale agriculture, which is labour intensive, uses little fossil fuel energy and can actually help stop the effects of climate change; a genuine agrarian reform to strengthen peasant agriculture; promoting food production as the primary land use; and considering food as a basic human right that should not be treated mainly as a commodity. Local food production should be supported because it avoids unnecessary transport, while patterns of production and consumption that promote waste and unnecessary consumption by a minority of humanity should be stopped because hundreds of millions of people still suffer hunger" (Martinez-Alier, 2011, p.157).

The demands of environmental justice movements, therefore, entail a way out of the metabolic rift induced by industrial agriculture, which can be translated into the need for economic degrowth (Martinez-Alier, 2012). According to Kallis et al. (2015, p. 3), degrowth "calls for the decolonization of public debate from the idiom of economism and for the abolishment of economic growth as a social objective". More specifically, it points to "a desired direction, one in which societies will use fewer natural resources and will organize and live differently than today. 'Sharing', 'simplicity', 'conviviality', 'care' and the 'commons' are primary significations of what this society might look like". Degrowth, thus, constitutes a theoretical framework, idea, project, or movement embedded in diverse fields of knowledge, such as political ecology, ecological economics, and moral philosophy, to which the ideology of ecological neo-narodnism is closely connected.

Agroecological production systems are vital to the attainment of a prosperous and fair degrowth. Although the belief that diminished economic activity might lead to higher subjective wellbeing levels is controversial, with complex interactions taking place as the economy shrinks, some degrowth theorists argue that, even if not necessarily making individuals happier, the observance of proper policies could

assure the fulfillment of basic human needs for all, and therefore a sustainable existence (Koch et al., 2017). Still, fewer formal working hours, a stronger connectedness to other human beings and to the surrounding environment, widespread social equality leading to less envy, rivalry, or isolation, and increasing personal free time and autonomy are some of the elements that might link degrowth to enhanced life satisfaction levels (Sekulova, 2015). These elements are strikingly in line with the ecological utopianism of Chernyshevskii, as is evident from the description of a utopian future he offers in his masterpiece *What is to Be Done?*.

The same elements are also present in ecological neo-narodnism, and it is by means of the political activism of peasant movements that they might become reality. The debate over the causes of and solutions to social and environmental problems of the 21st century is multifaceted, polemic and often contradictory. It must respect different cultural values and practices in democratic settings. Diverse points of view can be found within the same group of interest, scientific discipline, or culture. Economic, scientific, moral, and political factors are juxtaposed in a social context in which discourses and power relations are as important as widely accepted scientific truths. The latter are appropriated by groups of interest with discourses that, weighed by their power or influence, are able to form and consolidate a determined worldview that, in turn, shapes social reality. A paradigmatic or systemic shift against current patterns of accumulation depends fundamentally on the downfall of the dominant, powerful discourse of the hegemonic capitalistic consensus, either in a structured and consented way or tragically by the ecological collapse of the planet. Either grounded on science or justice, and either motivated by environmental or social concerns, this shift incorporates a wide array of forms in which the relations between happiness and the fulfillment of basic human needs are explored to face business-as-usual and modernization-like solutions to current global socioecological challenges.

# 6 CONCLUSION

This work attempted to contribute to the history and philosophy of EET. The first essay brought a historical account of EET in the 1880s-1930s, showcasing its intellectual diversity and foundation on social energetics. A scientific metaparadigm was identified, combining different values, methods, and ideas into an ecological critique of mainstream economics, comprised of a biophysical approach to economic processes that accounts for entropic phenomena and describes economic activity in terms of the flows of energy and materials. Such results were then compared to the current methodological situation of ecological economics, in which there is an emerging view in favor of accepting virtually any scientific development related to the dynamics between nature and society, including mainstream environmental economics. This new call for a more radical pluralism triggered criticisms demanding a proper analysis of what would be the benefits and limits of methodological pluralism within ecological economics. It was here speculated that the biophysical and allocative approaches to the relations between nature and the economy would enjoy more freedom and autonomy, as well as make more scientific progress, in a healthy competitive environment composed of two separate disciplines. The advantages of pluralism would be truly manifest if, by being sorted into separate disciplines, opposed views could interact and compete in more fertile ways, each kept independent and protected from sociopolitical dominance.

Bearing in mind the advancements in EET between the 1880s and 1930s, the second essay addressed the body of knowledge produced by early Soviet ecology in the 1920s. Research on the links between community ecology, conservation and economic planning revealed how innovative their views were – including their notions of natural capital and ecosystem services – and how well they fit into the definition of ecological utopianism.

The third essay acknowledged 19$^{th}$-century narodnism not only as a Russian root of early Soviet ecology, but as an important school of EET on its own. The ecological utopianism of *narodnik* thinker Nikolai Chernyshevskii was explained in

terms of the extent his ideas were grounded in the natural sciences, and how he envisioned egalitarian social ideals which would serve as inspiration for the narodnist revolutionary movement.

The fourth essay analyzed the ideology of ecological neo-narodnism as a viable alternative to deal with the social and ecological challenges of the 21st century. It was argued that, as political economy, it should move beyond Chaianovian economics to redeem the principles of communality and cooperation of Chernyshevskii. As political ecology, it is a true heir of narodnism; it is best represented by environmental justice movements; it combines the ethnical and local character of peasants' movements with the need for internationalization; it addresses power relations as a key issue to enforce peasant's rights; and it adds biophysical limits as a new argument in favor of systemic change.

The historical and contemporary issues discussed here are expected to contribute to the debate on the future of humankind on Earth, from the question of whether capitalism is compatible with a sustained human existence in a finite planet (and, if not, what should it transition into and which elements are to be retained or discarded) to whether alternative socioeconomic systems such as ecological neo-narodnism are, in fact, viable in the long-term. Utopias are needed in this debate, especially those that abide by our understanding of the reality of nature, its possibilities, and its boundaries. Otherwise, there are no limits to the creative conceptualization of utopias. A moral requirement is, nevertheless, suggested: joy and freedom for human and non-human beings.

# REFERENCES


ÅKERMAN, M. What does “Natural Capital” do? The role of metaphor in economic understanding of the environment. **Environmental Values.** v.12, p.431-448, 2003.

ACOSTA, A. El Buen Vivir como alternativa al desarrollo. Algunas reflexiones económicas y no tan económicas. **Política y Sociedad.** v.52, n.2, p.299-330, 2015.

ADAMS, H. **The degradation of the democratic dogma.** New York: Macmillan, 1919. 317p.

AKHABBAR, A., ALLISSON, F. Russian political economy from utopia to social engineering: an introduction. **Œconomia.** v.4, n.1, p.5-15, 2014.

ALTVATER, E. **Der Preis des Wohlstands:** oder Umweltplünderung und neue Welt(un)ordnung. Münster: Verlag Westfalisches Dampfboot, 1992. 261p.

ANDERSEN, M. S., MASSA, I. Ecological modernization — origins, dilemmas and future directions. **Journal of Environmental Policy & Planning.** v.2, n.4, p.337-345, 2000.

ANDERSON, B., M’GONIGLE, M. (2012). Does ecological economics have a future? Contradiction and reinvention in the age of climate change. **Ecological Economics.** v.84, p.37-48, 2012.

ARTO, I. et al. The energy requirements of a developed world. **Energy for Sustainable Development.** v.33, p.1-13, 2016.

AUERBACH, F. **Ektropismus und die physikalische Theorie des Lebens.** Leipzig: Wilhelm Engelmann, 1910. 99p.

BAILES, K. E. Philosophy and politics in Soviet history: the case of Vladimir Vernadskii. **The Russian Review.** v.40, n.3, p.278-299, 1981.

BALLOD-ATLANTICUS, C. **Der Zukunftsstaat:** Produktion und Konsum im Sozialstaat. 2. ed. Stuttgart: Dietz, 1919. 240p.

BARLOW, N. (Org.) **The autobiography of Charles Darwin, 1809-1882.** London: Collins, 1958. 253p.

BARNETT, V. **Kondratiev and the dynamics of economic development:** long cycles and industrial growth in historical context. Basingstoke, UK: MacMillan Press, 1998. 262p.

BARNETT, V. **A history of Russian economic thought.** Abingdon, UK: Routledge, 2005. 172p.

BAUMGÄRTNER, S. et al. Relating the philosophy and practice of ecological economics: the role of concepts, models and case studies in inter- and transdisciplinary sustainability research. **Ecological Economics.** v.67, p.381-393, 2008.

BERLIN, I. **Russian thinkers**. London: Penguin Books, 1994 [1978]. 312p.

BERNSTEIN, H. Notes on capital and peasantry. **Review of African Political Economy.** v.4, n.10, p.60-73, 1977.

BOGDANOV, A. A. Tektologia: universal organizational science. In: DUDLEY, P. (Org.) **Bogdanov's Tektology:** Book 1. Hull, UK: Center for Systems Studies Press, 1996 [1913].

BOGDANOV, A. A. **The philosophy of living experience.** Popular outlines. Leiden, The Netherlands: Brill, 2016 [1923]. 266p.

BOLL, M. M. From empiriocriticism to empiriomonism: the Marxist phenomenology of Aleksandr Bogdanov. **The Slavonic and East European Review.** v.59, n.1, p.41-58, 1981.

BOLTZMANN, L. **Populäre Schriften.** Leipzig: Barth, 1905. 440p.

BOULDING, K. E. The economics of the coming spaceship earth. In: JARRETT, H. (Org.) **Environmental quality in a growing economy.** Baltimore: John Hopkins University Press, 1966. p.3-14.

BRASS, T. Latin American peasants - new paradigms for old? **The Journal of Peasant Studies.** v.29, n.3-4, p.1-40, 2002.

BROWN, G. M. et al. Early pioneers in natural resource economics. **Annual Review of Resource Economics.** v.8, p.25-42, 2016.

BUDYKO, M. I. **Global ecology.** Moscow: Progress Publishers, 1980. 322p.

BUKHARIN, N. I. **Historical materialism:** a system of sociology. New York: International Publishers, 1925. 318p.

BURKETT, P. **Marxism and ecological economics:** toward a red and green political economy. Chicago: Haymarket Books, 2009. 355p.

BUTTEL, F. H. Ecological modernization as social theory. **Geoforum.** v.31, n.1, p.57-65, 2000.

CARPENTER, J. R. Recent Russian work on community ecology. **Journal of Animal Ecology.** v.8, n.2, p.354-386, 1939.

CARSON, R. **Silent spring.** Greenwich, USA: Crest Book, 1964. 304p.

CARVER, T. N. **The economy of human energy.** New York: Macmillan, 1924. 287p.

CHALMERS, A. F. **What is this thing called science?** 3. ed. Indianapolis: Hackett, 1999. 266p.

CHATTOPADHYAY, K. **Early Soviet commitment to environment protection and its decline.** International Viewpoint – online socialist magazine, 2014. Available at: <http://www.internationalviewpoint.org/spip.php?article3644>. Retrieved: March 27, 2017.

CHERNYSHEVSKII, N. G. O pozemelnoi sobstvennosti [On Land Ownership]. **Sovremennik.** v.9/11, p.405-504, 1857.

CHERNYSHEVSKII, N. G. Kritika filosofskikh predubezhdenii protiv obshchinnogo vladeniia [Criticism of philosophical prejudices against communal ownership]. **Sovremennik.** v.12, p.304-333, 1858a.

CHERNYSHEVSKII, N. G. O novykh usloviiakh selskogo byta [On the new conditions of rural life]. **Sovremennik.** v.2, p.50-85, 1858b.

CHERNYSHEVSKII, N. G. Ekonomicheskaia deiatelnost i zakonodatelstvo [Economic activity and law making]. **Sovremennik.** v.2, p.422-463, 1859a.

CHERNYSHEVSKII, N. G. Ustroistvo byta pomeshchichikh krestian, Nº VI – Truden li vykup zemli? [Organization of the mode of life of land-owning peasants, Nº VI – Is the redemption of land difficult?]. **Sovremennik.** v.1, p.334-392, 1859b.

CHERNYSHEVSKII, N. G. Ustroistvo byta pomeshchichikh krestian, Nº X – bibliografiia zhurnalnykh statei po krestianskomu voprosu [Organization of the mode of life of land-owning peasants, Nº X – Bibliography of journal articles on the peasant question]. **Sovremennik.** v.7, p.500-525, 1859c.

CHERNYSHEVSKII, N. G. Antropologicheskii printsip v filosofii [The anthropological principle in philosophy]. **Sovremennik.** v.4-5, p.179-239, 1860.

CHERNYSHEVSKII, N.G. **Nabroski iz razdela "Maltusov zakon"** [Sketches from the section “Malthusian Law”]. Moscow: Gosudarstvennoe Izdatelstvo Khudozhestvennoi Literatury, 1949a [1860–1861]. Polnoe sobranie sochinenii v 15 tomakh (T. 9) [Complete works in 15 volumes (Vol. 9)], p.743–756.

CHERNYSHEVSKII, N. G. **Zamechaniia na poslednie chetyre glavy pervoi knigi Millia** [Notes on the last four chapters of the first book of Mill]. Moscow: Gosudarstvennoe Izdatelstvo Khudozhestvennoi Literatury, 1949b [1860–1861]. Polnoe sobranie sochinenii v 15 tomakh (T. 9) [Complete works in 15 volumes (Vol. 9)], p.251–334.

CHERNYSHEVSKII, N. G. **On the aesthetic relations of art to reality.** Moscow: Foreign Languages Publishing House, 1953 [1855]. Selected philosophical essays, p.382-412.

CHERNYSHEVSKII, N. G. **The anthropological principle in philosophy.** Moscow: Foreign Languages Publishing House, 1953 [1860]. Selected philosophical essays, p.49-135.

CHERNYSHEVSKII, N. G. **Preface to and comments on Carpenter's *Energy in Nature*.** Moscow: Foreign Languages Publishing House, 1953 [1884]. Selected philosophical essays, p.504-513.

CHERNYSHEVSKII, N. G. **Sochineniia v dvukh tomakh** (Tom 2) [Works in two volumes (Vol. 2)]. Moscow: Izdatelstvo Mysl, 1987. 688p.

CHERNYSHEVSKII, N. G. **Proiskhozhdenie teorii blagotvornosti borby za zhizn** [The origin of the theory of the benefits of the struggle for life]. Moscow: Izdatelstvo Mysl, 1987 [1888]. Sochineniia v dvukh tomakh (Tom 2) [Works in two volumes (Vol. 2)], p.503-543.

CHERNYSHEVSKII, N. G. **What is to be done?** Ithaca & London: Cornell University Press, 1989 [1863]. 464p.

CHESNOKOV, V. S. Vladimir Ivanovich Vernadskii: velikii nauchnyi novator i gumanist [V. I. Vernadskii: great scientific innovator and humanist]. **Vek Globalizatsii.** v.1, p.150-166, 2013.

CHRISTENSEN, P. P. Classical roots for a modern materials-energy analysis. **Ecological Modelling.** v.38, p.75-89, 1987.

CHRISTENSEN, P. P. Historical roots for ecological economics – biophysical versus allocative approaches. **Ecological Economics.** v.1, p.17-36, 1989.

CLAUSIUS, R. **Über die Energievorräte der Natur und ihre Verwertung zum Nutzen der Menschheit.** Bonn: Max Cohen & Sohn, 1885. 26p.

CLEVELAND, C. J. Biophysical economics: historical perspective and current research trends. **Ecological Modelling.** v.38, p.47-73, 1987.

COHEN, R. S., NEURATH, M. (Orgs.) **Philosophical Papers, 1913-1946.** Dordrecht/Boston/Lancaster: D. Reidel, 1983. 268p.

CORAZZA, C., VICTUS, S. Economy of permanence. In: D'ALISA, G. et al. (Orgs.) **Degrowth:** a vocabulary for a new era. Abingdon, UK: Routledge, 2015. p.205-207.

COSTANZA, R. What is ecological economics? **Ecological Economics.** v.1, p.1-7, 1989.

COSTANZA, R. (Org.) **Ecological Economics:** the science and management of sustainability. New York: Columbia University Press, 1991. 525p.

COTTRELL, W. F. **Energy and society:** the relation between energy, social change, and economic development. New York: McGraw-Hill, 1955. 330p.

DALY, H. E. On economics as a life science. **Journal of Political Economy.** v.76, p.392-406, 1968.

DOW, S. C. Structured pluralism. **Journal of Economic Methodology.** v.11, n.3, p.275-290, 2004.

DOW, S. C. Variety of methodological approach in economics. **Journal of Economic Surveys.** v.21, n.3, p.447-465, 2007.

ECKBERG, D. L., HILL, L. Jr. The paradigm concept and sociology: a critical review. **American Sociological Review**. v.44, n.6, p.925-937, 1979.

EL-SAYED, Y. M. **The thermoeconomics of energy conversions.** Oxford, UK: Elsevier, 2003. 264p.

ELSNER, H. **The technocrats:** prophets of automation. Syracuse: Syracuse University Press, 1967. 252p.

FEUERBACH, L. Das Wesen des Christenthums in Beziehung auf den “Einzigen und sein Eigentum”. **Wigands Vierteljahrsschrift.** v.2, p.193-205, 1845.

FISHER, D. R., FREUDENBURG, W. R. Ecological modernization and its critics: assessing the past and looking toward the future. **Society and Natural Resources.** v.14, n.8, p.701-709, 2001.

FOSTER, J. B. **Marx’s ecology:** materialism and nature. New York: Monthly Review Press, 2000. 200p.

FOSTER, J. B. Late Soviet ecology and the planetary crisis. **Monthly Review.** v.67, n.2, p.1-20, 2015.

FOSTER, J. B., BURKETT, P. Ecological economics and classical Marxism: the “Podolinsky business” reconsidered. **Organization & Environment.** v.17, n.1, p.32-60, 2004.

FRANK, J. **Through the Russian prism:** essays on literature and culture. New Jersey, Princeton University Press, 1990. 251p.

GAMBLIN, G. J. **Russian populism and its relations with anarchism 1870-1881**. 1999. 347f. Thesis (PhD in Philosophy) – Centre for Russian and East European Studies, University of Birmingham, Birmingham, 1999.

GARE, A. Soviet environmentalism: the path not taken. **Capitalism Nature Socialism.** v.4, n.4, p.69-88, 1993.

GARE, A. Aleksandr Bogdanov: proletkult and conservation. **Capitalism Nature Socialism.** v.5, n.2, p.65-94, 1994.

GARE, A. **Nihilism Inc.:** environmental destruction and the metaphysics of sustainability. Como, Australia: Eco-Logical Press, 1996. 444p.

GARE, A. Aleksandr Bogdanov and systems theory. **Democracy & Nature.** v.6, n.3, p.341-359, 2000.

GARE, A. Aleksandr Bogdanov’s history, sociology and philosophy of science. **Studies in History and Philosophy of Science Part A.** v.31, n.2, p.231-248, 2000a.

GARE, A. The environmental record of the Soviet Union. **Capitalism Nature Socialism.** v.13, n.3, p.52-72, 2002.

GEDDES, P. **John Ruskin, economist.** Edinburgh: William Brown, 1884. 43p.

GEDDES, P. An analysis of the principles of economics. **Proceedings of the Royal Society of Edinburgh.** v.12, p.943-980, 1884a.

GEORGESCU-ROEGEN, N. Economic theory and agrarian economics. **Oxford Economic Papers.** v.12, n.1, p.1-40, 1960.

GEORGESCU-ROEGEN, N. **The entropy law and the economic process.** Cambridge, MA: Harvard University Press, 1971. 457p.

GEORGESCU-ROEGEN, N. Energy analysis and economic valuation. **Southern Economic Journal.** v.45, n.4, p.1023-1058, 1979.

GEORGESCU-ROEGEN, N. On Neo-Populism and Marxism: a comment on Utsa Patnaik. **The Journal of Peasant Studies.** v.8, n.2, p.242-243, 1981.

GOLLEY, F. B. **A history of the ecosystem concept in ecology:** more than the sum of the parts. New Haven: Yale University Press, 1993. 254p.

GÓMEZ-BAGGETHUN, E.; DE GROOT, R.; LOMAS, P. L.; MONTES, C. The history of ecosystem services in economic theory and practice: from early notions to markets and payment schemes. **Ecological Economics.** v.69, p.1209-1218, 2010.

GOWDY, J., ERICKSON, J. D. The approach of ecological economics. **Cambridge Journal of Economics.** v.29, p.207-222, 2005.

GRIGORIAN, M. N. G. Chernyshevsky's world outlook. In: CHERNYSHEVSKII, N. G. **Selected philosophical essays**. Moscow: Foreign Languages Publishing House, 1953. p.5-46.

GRIGORIAN, N. Thomas Malthus and Nikolai Chernyshevskii: struggle for existence of mutual help? **Russian Literature.** v.81, p.67-83, 2016.

HAMBURG, G. M. Russian intelligentsias. In: LEATHERBARROW, W., OFFORD, D. (Orgs.) **A history of Russian thought.** Cambrige, UK: Cambridge University Press, 2010. p.44-69.

HAYEK, F. A. von. **The counter-revolution of science:** studies on the abuse of reason. Indianapolis: Liberty Fund Inc.,1980 [1952]. 415p.

HOGBEN, L. **Science for the citizen:** a self-educator based on the social background of scientific discovery. London: George Allen & Unwin, 1938. 1120p.

HOGBEN, L. **Dangerous thoughts.** London: George Allen & Unwin, 1939. 300p.

HOTELLING, H. The economics of exhaustible resources. **Journal of Political Economy.** v.39, p.137-175, 1931.

ILLGE, L., SCHWARZE, R. A matter of opinion – how ecological and neoclassical environmental economists think about sustainability and economics. **Ecological Economics.** v.68, p.594-604, 2009.

JASNY, N. A Soviet planner: V. G. Groman. **The Russian Review.** v.13, n.1, p.52-58, 1954.

JENSEN, K. M. **Beyond Marx and Mach.** Aleksandr Bogdanov's Philosophy of Living Experience. Dordrecht, Holland: D. Reidel, 1944. 189p.

JEVONS, W. S. **The coal question:** an inquiry concerning the progress of the nation, and the probable exhaustion of our coal mines. 2. ed. London: Macmillan, 1866. 383p.

JOHNSON, E. D. **How St. Petersburg learned to study itself:** the Russian idea of kraevedenie. University Park, PA: Pennsylvania State University Press, 2006. 303p.

JOSEPHSON, P. et al. **An environmental history of Russia**. Cambridge, UK: Cambridge University Press, 2013. 340p.

KALLIS, G., et al. Introduction: degrowth. In: D'ALISA, G. et al. (Orgs.) **Degrowth:** a vocabulary for a new era. Abingdon, UK: Routledge, 2015. p.1-19.

KARAÖMERLIOGLU, M. A. On Russian populism – to the memory of Allan K. Wildman. **UCLA Historical Journal**. v.16, n.0, p.131-148, 1996.

KASHKAROV, D. N. **Osnovy Ekologii Zhivotnykh** [Fundamentals of Animal Ecology] 2. ed. Leningrad: Publishing House of the People's Commissariat of Education of the RSFSR, 1944. 383p.

KASHKAROV, D. N., KOROVIN, E. P. **Ekologia na sluzhbe sotsialisticheskogo stroitelstva:** ee rol i zadachi [Ecology in the service of socialist construction: its role and tasks]. Tashkent: Acta Universitatis Asiae Mediae, 1933. 35p.

KATS, Y. Bogdanov, Marx, and the limits to growth debate. **The European Legacy: Toward New Paradigms.** v.9, n.3, p.305-316, 2004.

KEANE, J. **History of Russian populism provides important lessons for today**. 2016. Available at: <http:// theconversation.com/history-of-russian-populism-provides-important-lessons-for-today-67476>. Retrieved: April 11, 2017.

KELLY, A. Empiriocriticism: a Bolshevik philosophy? **Cahiers du Monde Russe et Soviétique.** v.22, n.1, p.89-118, 1981.

KLAASSEN, G. A. J., OPSCHOOR, J. B. Economics of sustainability or the sustainability of economics: different paradigms. **Ecological Economics.** v.4, p.93-115, 1991.

KOCH, M. et al. Shifting priorities in degrowth research: an argument for the centrality of human needs. **Ecological Economics.** v.138, p.74-81, 2017.

KOZHEVNIKOV, G. A. O neobkhodimosti ustroistva zapovednikh uchastkov dlia okhrany russkoi prirody [The necessity of establishing reserves for the protection of Russian nature]. **Okhrana Prirody i Zapovednoe v SSSR.** v.4, p.90-97, 1960 [1909].

KUHN, T. S. **The structure of scientific revolutions.** 3. ed. Chicago: University of Chicago Press, 1996 [1962]. 212p.

KULA, E. **History of environmental economic thought.** London: Routledge, 1998. 235p.

KUMARAPPA, J. C. **Economy of permanence.** Varanasi, India: Sarva Seva Sangh Prakashan, 1945. 169p.

LAMPERT, E. **Sons against fathers:** studies in Russian radicalism and revolution. Oxford, UK: Clarendon Press, 1965. 405p.

LEFF, E. **Ecología y capital.** Hacia una perspectiva ambiental del desarollo. México, D.F.: Universidad Nacional Autónoma de México, 1986. 147p.

LEFF, E. **Racionalidad ambiental:** la reapropiación social de la naturaliza. México, D.F.: Siglo XXI Editores, 2004. 479p.

LENIN, V. I. **Materialismo y empiriocriticismo.** Moscow: Editorial Progreso, n.d. 422p.

LINDEMAN, R. L. The trophic-dynamic aspect of ecology. **Ecology.** v.23, n.4, p.399-417, 1942.

LO, A. **The problem of methodological pluralism in ecological economics.** Munich: University Library of Munich, 2014. 43p. (MPRA Paper, 49543)

LOTKA, A. J. **Elements of physical biology.** Baltimore: Williams & Wilkins, 1925. 460p.

LÖWY, M. **Ecosocialism:** a radical alternative to capitalist catastrophe. Chicago: Haymarket Books, 2015. 144p.

LUNACHARSKII, A. V. **Self-education of the workers:** the cultural task of the struggling proletariat. London: The Workers' Socialist Federation, 1918. Available at: <https://www.marxists.org/archive/lunachar/1918/self-education.htm>. Accessed Sep. 04th 2018.

MAJOR, J. Historical development of the ecosystem concept. In: VAN DYNE, G. M. (Org.) **The ecosystem concept in natural resource management.** New York: Academic Press, 1969. p.9-22.

MALININ, B. A. **Istoriia Russkovo utopicheskovo sotsialiszma:** vtoraia polovina XIX nachalo XX beka [The history of Russian utopian socialism: the second half of the 19th century and beginning of the 20th century]. Moscow: Nauka, 1972. 272p.

MALININ, B. A. **Filosofiia revoliutsionnovo narodnichestva** [Philosophy of revolutionary narodnism]. Moscow: Nauka, 1991. 340p.

MALININ, B. A., SIDOROV, M. I. **Predshestvenniki nauchnovo sotsializma v Rossii** [Predecessors of scientific socialism in Russia]. Moscow: Publishing House VPSh and AON under the CPSU Central Committee, 1963. 254p.

MALLY, L. **Culture of the future:** the Proletkult movement in revolutionary Russia. Berkeley: University of California Press, 1990. 307p.

MARINICHEVA, M. P. et al. (Orgs.) **K. Marx, F. Engels i revoliutsionnaia Rossia** [K. Marx, F. Engels and Revolutionary Russia]. Moscow: Politicheskaia Literatury Publishing House, 1967.

MARTINEZ-ALIER, J. **Energy-related issues in early economic literature:** summaries and bibliography. Ottawa, Canada: Energy Research Group Manuscript Reports, 1986. 62p.

MARTINEZ-ALIER, J. **Ecological economics:** energy, environment and society. Oxford, UK: Basil Blackwell, 1987. 287p.

MARTINEZ-ALIER, J. Ecological economics and eco-socialism. **Capitalism Nature Socialism.** v.1, n.2, p.109-122, 1988.

MARTINEZ-ALIER, J. Ecologismo marxista y neo-narodnismo ecologista. **Mientras Tanto.** v.39, p.145-152, 1989.

MARTINEZ-ALIER, J. In praise of smallholders. **The Journal of Peasant Studies.** v.23, n.1, p.140-148, 1995.

MARTINEZ-ALIER, J. Some issues in agrarian and ecological economics, in memory of Georgescu-Roegen. **Ecological Economics.** v.22, p.225-238, 1997.

MARTINEZ-ALIER, J. **The environmentalism of the poor:** a study of ecological conflicts and valuation. Cheltenham, UK: Edward Elgar, 2002. 312p.

MARTINEZ-ALIER, J. The EROI of agriculture and its use by the Via Campesina. **The Journal of Peasant Studies.** v.38, n.1, p.145-160, 2011.

MARTINEZ-ALIER, J. Environmental justice and economic degrowth: an alliance between two movements. **Capitalism Nature Socialism.** v.23, n.1, p.51-73, 2012.

MARTINEZ-ALIER, J., NAREDO, J. M. A Marxist precursor of energy economics: Podolinsky. **The Journal of Peasant Studies.** v.9, n.2, p.207-224, 1982.

MARTINEZ-ALIER, J., SCHLÜPMANN, K. **La ecología y la economía.** Ciudad de México: Fondo de Cultura Económica, 1991. 367p.

MASTERMAN, M. The nature of a paradigm. In: LAKATOS, I., MUSGRAVE, A. (Orgs.) **Criticism and the growth of knowledge.** London: Cambridge University Press, 1970. p.59-90.

MATTICK, P. **Anti-Bolshevik communism.** Monmouth, UK: Merlin Press, 2007 [1978]. 231p.

MEADOWS, D. H. et al. **The limits to growth:** a report for the Club of Rome's project on the predicament of mankind. New York: Universe Books, 1972. 205p.

MEDZHIBOVSKAYA, I. Goethe and Hegel in the Commissariat of Enlightenment: Anatoly Lunačarskij's program of Bolshevik–Marxist aesthetics. **Studies in East European Thought.** v.65, p.227-241, 2013.

MIROWSKI, P. **More heat than light:** economics as social physics, physics as nature's economics. Cambridge, UK: Cambridge University Press, 1989. 450p.

MISSEMER, A. William Stanley Jevons' The Coal Question (1865), beyond the rebound effect. **Ecological Economics.** v.82, p.97-103, 2012.

MISSEMER, A. Natural capital as an economic concept, history and contemporary issues. **Ecological Economics.** v.143, p.90-96, 2018.

MOL, A. P. J. Ecological modernization and the global economy. **Global Environmental Politics.** v.2, n.2, p.92-115, 2002.

MORAN, E. F. **Environmental social science:** human-environment interactions and sustainability. Chichester, UK: Wiley-Blackwell, 2010. 215p.

NEMETH, E. The philosophy of the "Other Austrian Economics". In: ANDERSEN, H. et al. (Orgs.) **New challenges to philosophy of science.** Dordrecht/Heidelberg/New York/London: Springer, 2013. p.339-350.

NEURATH, O. **Wirtschaftsplan und Naturalrechnung:** von der Sozialistischen Lebensordnung und vom kommenden Menschen. Berlin: Laub, 1925. 114p.

NEURATH, O. Physicalism: the philosophy of the Viennese Circle. In: COHEN, R. S., NEURATH, M. (Orgs.) **Philosophical Papers, 1913-1946.** Dordrecht/Boston/Lancaster: D. Reidel, 1983 [1931]. p.48-51.

NIKONOW, A. A., SCHULZE, E. **Drei Jahrhunderte Agrarwissenschaft in Russland:** von 1700 bis zur Gegenwart. Halle, Germany: Institut für Agrarentwicklung in Mittel- und Osteuropa, 2004. Available at: <http://www.iamo.de/dok/sr_vol27.pdf>. Retrieved: March 07, 2017.

NORGAARD, R. B. The case for methodological pluralism. **Ecological Economics.** v.1, p.37-57, 1989.

NORMANO, J. F. **The spirit of Russian economics**. New York: John Day, 1945. 170p.

OFFORD, D. **The Russian revolutionary movement in the 1880s**. Cambridge, UK: Cambridge University Press, 1986. 196p.

OSTWALD, W. **Energetische Grundlagen der Kulturwissenschaft.** Leipzig: Werner Klinkhardt, 1909. 184p.

ÖZKAYNAK, B. et al. The identity of ecological economics: retrospects and prospects. **Cambridge Journal of Economics.** v.36, p.1123-1142, 2012.

PALMIERI, F. A. The earliest theorists of the Russian revolution. **The Catholic World**. v.108, p.477-487, 1918-1919.

PATEL, R. **Stuffed and starved:** the hidden battle for the world food system. 2. Ed. Brooklyn, USA: Melville House Publishing, 2012. 432p.

PATNAIK, U. Neo-populism and Marxism: the Chayanovian view of the agrarian question and its fundamental fallacy. **The Journal of Peasant Studies.** v.6, n.4, p.375-420, 1979.

PATNAIK, U. Reply to Nicholas Georgescu-Roegen. **The Journal of Peasant Studies.** v.8, n.2, p.244-246, 1981.

PAZHITNOV, K. A. **Istoriia kooperativnoi mysli** [The history of cooperative thought]. Saint Petersburg: Kooperatsiia, 1918. 176p.

PEACE, R. Nihilism. In: LEATHERBARROW, W., OFFORD, D. (Orgs.) **A history of Russian thought.** Cambridge, UK: Cambridge University Press, 2010. p.116-140.

PEARCE, D. Economics, equity and sustainable development. **Futures.** v.20, n.6, p.598–605, 1988.

PEARCE, D. An intellectual history of environmental economics. **Annual Review of Energy and the Environment.** v.27, p.57-81, 2002.

PETERSEN, W. **Malthus.** Cambridge, MA: Harvard University Press, 1979. 302p.

PETRAS, J., VELTMEYER, H. Are Latin American peasant movements still a force for change? Some new paradigms revisited. **The Journal of Peasant Studies.** v.28, n.2, p.83-118, 2001.

PETROV, P. Gorky's return and the energetics of Soviet socialism. **Studies in East European Thought.** v.70, p.41-60, 2018.

PFAUNDLER, L. Die Weltwirtschaft im Lichte der Physik. **Deutsche Revue.** v.27, n.2, p.29-38/171-182, 1902.

PIMENTEL, D. et al. Food production and the energy crisis. **Science.** v.182, p.443-449, 1976.

PLEKHANOV, G. V. et al. **Gruppa osvobozhdenie truda** [Group Emancipation of Labor]. Moscow: State Publishing House, 1883. 307p.

PODOLINSKII, S. A. Socialism and the unity of physical forces. **Organization & Environment.** v.17, n.1, p.61–75, 2004 [1881].

PONOMAREV, A. I. Kontseptsiia noosfery V. I. Vernadskogo i problemy ekonomicheskoi teorii [V. I. Vernadskii's concept of noosphere and problems of economic theory]. In: ZHAMIN, V.A. (Org.) **Istoki:** voprosy istorii narodnogo khoziaistva i ekonomicheskoi mysli [Origins: questions on the history of the national economy and economic thought] (Issue 1). Moscow: Ekonomika, 1989. p.220-234.

POPPER-LYNKEUS, J. **Allgemeine Nährpflicht als Lösung der sozialen Frage:** eingehend bearbeitet und statistisch durchgerechnet; mit einem Nachweis der theoretischen und praktischen Wertlosigkeit der Wirtschaftslehre. Dresden: Reissner, 1912. 813p.

POTASH, M. A. **Narodnicheskii sotsializm** [Narodnik socialism]. Moscow: State Publishing House, 1930. 176p.

RAJAN, S. R. A history of environmental justice in India. **Environmental Justice.** v.7, n.5, p.117-121, 2014.

RASKOV, D. Socialist agrarian utopia in the 1920s: Chayanov. **Œconomia.** v.4, n.2, p.123-146, 2014.

RAWORTH, K. **Doughnut economics:** seven ways to think like a 21st century economist. White River Junction, USA: Chelsea Green Publishing, 2017. 320p.

ROCKSTRÖM, J. et al. A safe operating space for humanity. **Nature.** v.461, p.472-475, 2009.

RØPKE, I. The early history of modern ecological economics. **Ecological Economics.** v.50, p.293-314, 2004.

RØPKE, I. Trends in the development of ecological economics from the late 1980s to the early 2000s. **Ecological Economics.** v.55, p.262-290, 2005.

RUSKIN, J. **Unto this last and other writings.** London: Penguin Classics, 1985 [1862]. 368p.

SACHER, E. **Grundzüge einer Mechanik der Gesellschaft:** theoretischer Theil. Jena: Gustav Fischer, 1881. 246p.

SACHS, I. Entering the Anthropocene: the twofold challenge of climate change and poverty eradication. In: MANCEBO, F., Sachs, I. (Orgs.) **Transitions to sustainability**. Dordrecht, Netherlands: Springer, 2015. p.7-18.

SANDMO, A. The early history of environmental economics. **Review of Environmental Economics and Policy.** v.9, n.1, p.43-63, 2015.

SANDNER, G. **Otto Neurath:** eine politische Biographie. Vienna: Paul Zsolnay Verlag, 2014. 352p.

SCOTT, H. et al. **Introduction to Technocracy.** 2. ed. New York: Technocracy Inc., 1938. 60p.

SEKULOVA, F. Happiness. In: D'ALISA, G. et al. (Orgs.) **Degrowth:** a vocabulary for a new era. Abingdon, UK: Routledge, 2015. p.113-116.

SHTILMARK, F. R. **History of the Russian zapovedniks, 1895–1995.** Edinburgh, UK: Russian Nature Press, 2003. 307p.

SIVAKUMAR. The unfinished Narodnik agenda: Chayanov, Marxism, and Marginalism revisited. **The Journal of Peasant Studies.** v.29, n.1, p.31-60, 2001.

SOCHOR, Z. A. **Revolution and culture:** the Bogdanov-Lenin controversy. Ithaca & London: Cornell University Press, 1988. 258p.

SODDY, F. **Cartesian Economics:** the bearing of physical science upon state stewardship. London: Hendersons, 1922. 32p.

SODDY, F. **Wealth, virtual wealth and debt:** the solution of the economic paradox. New York: E. P. Dutton, 1926. 320p.

SÖDERBAUM, P. Values, ideology, and politics in ecological economics. **Ecological Economics.** v.28, p.161-170, 1999.

SÖDERBAUM, P. Varieties of ecological economics: do we need a more open and radical version of ecological economics? **Ecological Economics.** v.119, p.420-423, 2015.

SOROKIN, P. **Contemporary sociological theories.** New York: Harper & Brothers, 1928. 785p.

SPASH, C. L. New foundations for ecological economics. **Ecological Economics.** v.77, p.36-47, 2012.

SPASH, C. L. The shallow or the deep ecological economics movement? **Ecological Economics.** v.93, p.351-362, 2013.

STANCHINSKII, V. V. Kraevedenie v Zapadnoi oblasti i ego osnovnye zadachi [Regional studies of the Western territory and their main tasks]. **Ekonomicheskaia Zhizn.** v.1-2, p.5-17, 1923.

STANCHINSKII, V. V. Sovremennost i kraevedenie [Modernity and regional studies]. **Ekonomicheskaia Zhizn.** v.3, p.4-37, 1923a.

STANCHINSKII, V. V. O znachenii ekologicheskogo metoda v razreshenii rastenievodcheskikh problem stepi [On the importance of the ecological method for solving crop problems of the steppe]. **Biuleten Fitotekhnichnoj Stantsij Zapovidnika "Chapli".** v.1 (Melitopol), p.3-8, 1930.

STANCHINSKII, V. V. K metodike kolichesvenogo izucheniia biotsenozov travianistykh assotsiatsii [Contribution to the method for a quantitative study of biocenoses of hebaceous associations]. **Zhurnal Ekologii i Biotsenologii.** v.1, n.1, p.133-137, 1931.

STANCHINSKII, V. V. **O nekotorykh osnovnykh poniatiiakh zoologii v svete sovremennoi ekologii** [On some basic concepts of zoology in the light of modern ecology]. In: ALL-UNION CONGRESS OF ZOOLOGISTS, ANATOMISTS AND HISTOLOGISTS, 4, 1931. Kiev. Proceedings. Kiev: Gosmedizdat USSR, 1931a. p.5-6.

STANCHINSKII, V. V. O znachenii massy vidovogo veshchestva v dinamicheskom ravnovesii biotsenozov. [On the importance of the mass of species in the dynamic equilibrium of biocenoses]. **Zhurnal Ekologii i Biotsenologii.** v.1, n.1, p.88-94, 1931b.

STANCHINSKII, V. V., KASHKAROV, D. N. Ot redaktsii [Editorial]. **Zhurnal Ekologii i Biotsenologii.** v.1, n.1, p.3-16, 1931.

STITES, R. **Revolutionary dreams:** utopian vision and experimental life in the Russian revolution. New York & Oxford: Oxford University Press, 1989. 307p.

SUKACHEV, V. N., DYLIS, N. **Fundamentals of forestry biogeocenology**. Edinburgh: Oliver & Boyd, 1968. 672p.

TACCONI, L. Scientific methodology for ecological economics. **Ecological Economics.** v.27, p.91-105, 1998.

TEPICHT, J. A project for research on the peasant revolution of our time. **The Journal of Peasant Studies.** v.2, n.3, p.257-269, 1975.

TERENTEV, P. V. Pamiati Daniila Nikolaevicha Kashkarova (1878–1941) [The memory of Daniil Nikolaevich Kashkarov]. **Russkii Ornitologicheskii Zhurnal.** v.5, p.237-241, 2016 [1948].

TODES, D. P. **Darwin without Malthus.** The struggle for existence in Russian evolutionary thought. New York & Oxford: Oxford University Press, 1989. 221p.

TOLEDO, V. M. **El otro zapatismo.** Luchas indígenas de inspiración ecológica en México. Ecología Política. v. 18, p.11-22, 1999.

TURIN, S. P. Nicholas Chernyshevsky and John Stuart Mill. **The Slavonic and East European Review.** v.9, n.25, p.29-33, 1930.

TURNER, R. K. et al. Ecological economics: paradigm or perspective. In: VAN DEN BERGH, J. C. J. M., VAN DER STRAATEN, J. (Orgs.) **Economy and ecosystems in change:** analytical and historical approaches. Cheltenham, UK: Edward Elgar, 1997. p.25-49.

TVARDOVSKAIA, V. A. **El populismo ruso.** Mexico City: Siglo XXI Editores, 1978. 229p.

URANOVSKY, Y. M. Marxism and natural science. In: BUKHARIN, N. I., DEBORIN, A. M., URANOVSKY, Y. M., VAVILOV, S. I., KOMAROV, V. L., TIUMENIEV, A. I. (Orgs.) **Marxism and modern thought.** Abingdon, UK: Routledge, 2011 [1936]. p.136-174.

VACCARO, I. et al. **Environmental social sciences:** methods and research design. Cambridge, UK: Cambridge University Press, 2010. 382p.

VEERMER, D. E. Food, farming and the future: the role of traditional agriculture in developing areas of the world. **Social Science Quarterly.** v.57, p.383-396, 1976.

VENTURI, F. **Roots of Revolution:** a history of the populist and socialist movements in 19th-century Russia. New York: Alfred A. Knopf, 1960. 850p.

VERNADSKII, V. I. **La Geochimie.** Paris: Felix Alcan, 1924. 404p.

VERNADSKII, V. I. Ocherednaia zadacha v izuchenii estestvennykh proizvoditelnykh sil [A new task on the study of natural productive forces]. **Nauchnyi Rabotnik.** v.7-8, p.3-21, 1926.

VERNADSKII, V. I. Vopros o estestvennykh proizvoditelnykh silakh v Rossii s XVIII po XX v. (fragmenty) [The question of natural productive forces in Russia from the 18th to the 20th centuries (fragments)]. In: IANSHIN, A. L., MIKULINSKII, S. R. (Orgs.). **Trudy po istorii nauki v Rossii** [Works on the history of science in Russia]. Moscow: Nauka, 1988 [1921-1922]. 333-342p.

VERNADSKII, V. I. O zadachakh i organizatsii prikladnoi nauchnoi raboty Akademii Nauk SSSR [On the tasks and organization of applied scientific work of the Academy of Sciences of USSR]. In: BASTRAKOVA, M. S., MOCHALOV, I. I., NEAPOLITANSKAIA, V. S. (Orgs.) **Nachalo i vechnost zhizni** [Beginning and eternity of life]. Moscow: Sovetskaia Rossiia, 1989 [1928]. p.354-398.

VERNADSKII, V. I. **The biosphere.** New York: Copernicus, 1997 [1926]. 185p.

VILLALBA-EGUILUZ, C. U., ETXANO, I. Buen vivir vs development (II): the limits of (neo-) extractivism. **Ecological Economics.** v.138, p.1-11, 2017.

VUCINICH, A. **Darwin in Russian thought.** Berkeley: University of California Press, 1989. 468p.

WALICKI, A. **A history of Russian thought:** from the Enlightenment to Marxism. Stanford: Stanford University Press, 1979. 456p.

WEINER, D. R. The historical origins of Soviet environmentalism. **Environmental Review.** v.6, n.2, p.42-62, 1982.

WEINER, D. R. Community ecology in Stalin's Russia – "socialist" and "bourgeois" science. **Isis.** v.75, n.4, p.684-696, 1984.

WEINER, D. R. The roots of "Michurinism": transformist biology and acclimatization as currents in the Russian life sciences. **Annals of Science.** v.42, n.3, p.243-260, 1985.

WEINER, D. R. **Models of nature:** ecology, conservation and cultural revolution in Soviet Russia. Pittsburgh: University of Pittsburgh Press, 1988. 324p.

WEINER, D. R. The changing face of Soviet conservation. In: WORSTER, D. (Org.) **The ends of the earth:** perspectives on modern environmental history. Cambridge, UK: Cambridge University Press, 1988a. p.252-273.

WEINER, D. R. **A little corner of freedom:** Russian nature protection from Stalin to Gorbachev. Berkeley: University of California Press, 1999. 556p.

WEINER, D. R. Struggle over the Soviet future: science education versus vocationalism during the 1920s. **The Russian Review.** v.65, p.72-97, 2006.

WHITE, L. Energy and the evolution of culture. **American Anthropologist.** v.45, n.3, p.335-256, 1943.

WHITE, L. The energy theory of cultural development. In: FRIED, M. H. (Org.) **Readings in anthropology.** New York: Thomas Y. Cromwell,1959. p.139-146.

WINIARSKI, L. **Essai sur la mécanique social.** Paris: Presses Universitaires de France, 1898. 38p.

WITTMAN, H. Reworking the metabolic rift: la Vía Campesina, agrarian citizenship, and food sovereignty. **The Journal of Peasant Studies.** v.36, n.4, p.805-826, 2009.

ZAFFARONI, E. R. La Pachamama y el humano. In: ACOSTA, A., MARTÍNEZ, E. (Orgs.) **La naturaleza con derechos:** de la filosofía a la política. Quito, Ecuador: Abya-Yala, 2011. p.25-137.