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THE SYSTEM APPROACH TO RESOURCE SCARCITY: BRIDGING ECOLOGY, ECONOMY AND SOCIETY

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ABSTRACT

Recent decades, the question of resource scarcity and its interrelations with demographic growth and impact to social and economic challenges, became part of global and national policy agendas. WEF, EC, World Bank, UNEP, OECD and global corporations join efforts to identify new models leading to paradigm shift in resource analysis and governance.

The traditional approach to resource through supply chain glasses, where resources exist only as part of the production process, had created a lot of damage to global ecological and social systems. During recent decades scientists and policy makers emphasize the need for a more integrative approach, unveiling interlinks, synergies and trade-offs between different resources, ant their interrelation with economic and social outcomes. The new models, such as *Green Economy*, *Nexus or Doughnut* create a shift in thinking about resource scarcity and fuels debates around sustainable economic growth strategies. The article presents main debates around novel approach to resource scarcity and provide comparative overview of the new systemic models of the resource analysis, heading toward sustainable economic growth strategies focusing to better balance of economic development, social inclusion and ecology.

Keywords: Sustainable economy, green economy, green growth, resource scarcity, land–water–food nexus, governance linkages, systems

JEL: O10, O13, Q51, Q53, Q55-Q58

1. INTRODUCTION

In recent years conversation around resource scarcity from theoretical discussions moved to the round tables for agreements, showing the urgent need to find new ways of solving fundamental

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global problems. Since the global financial crisis, the dramatic increase for food and fuel prices, together with the population growth ignited concerns over climate change, social inequalities and limited access to the critical natural resources.

In 2009 professor John Beddington, UK government's scientific advisor, stated that the world is heading toward a "perfect storm" of food shortages, water scarcity and insufficient energy resources, that threaten to unleash public unrest, cross-border conflicts and mass migration as people flee from the worst-affected regions. "We head into a perfect storm in 2030, because all of these things are operating on the same time frame" (The Guardian, 2009)[1].

The leading world scientist underlined, that particularly difficult situation is with shortage of water, food and energy, as they are all "intimately connected. "You can't think about dealing with one without considering the others. We must deal with all of these together" (The Guardian, 2009).

Since the 2008 World Economic Forum, global players and corporations acknowledged and exposed the interlinks between water, food, energy and climate change risks, giving it a name *Nexus.* The central point of these discussion is around resource scarcity impact to social welfare, economic production and environmental ecosystem (Meyer-Emerick, 2012; Allouche, Middleton, & Gyawali, 2014; World Economic Forum, 2014; Sachs, 2015; Boas, Biermann, & Kanie, 2016; De Laurentiis, Hunt, & Rogers, 2016; Benson, Gain et al., 2017; Kuipers, Van Oers, Verboon et al., 2018; Sweeney, 2019).

These historical debates elaborate different reasons and outcomes around global challenges documented by the World Economic Forum in 2014, namely: (1) threats of material exhaustion (i.e. physical limits); (2) concern about rising costs; (3) long-term abundance and (4) social injustice focused on distributional challenges (World Economic Forum, 2014).

2. SYSTEM MODELS FOR RESOURCE SCARCITY ANALYSIS

Scientific studies and debates around resource scarcity theme, represent broad variety of multilayer, competing perspectives, narratives and theories, that seek to highlight specific causal bonding between different domains and offer intervention strategies and outcome prognoses (Allouche, Middleton, & Gyawalim, 2014).

[1] The Guardian (18 Mar 2019). World faces 'perfect storm' of problems by 2030, chief scientist to warn. Available at: https://www.theguardian.com/science/2009/mar/18/perfect-storm-john-beddington-energy-food-climate.

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In this article, aiming to reflect the variety of perspectives are presented three positions, that reflect dominant contemporary approaches on resource scarcity and interlinks to economic or social issues. These are:

(1) **the boundaries and thresholds position**, which rises question - *how to sustain growth and development, preserving integrity of certain natural resource systems and stabilizing the biochemical process of the planet?*

(2) **the technological, market fix and governance position,** rises question – *how investments, technologies and governance strategies could help solving resource demand situations, avoiding or suspending environmental risks, emerging from destructive usage of the resources, and therefore could support sustainable economic growth?*

(3) **the structural inequality and distribution position,** analyses question – *how institutional and structural changes could lessen or eliminate resource scarcity or inaccessibility as well environmental damage problems created by social inequality and discriminatory governance?*.

2.1 The boundaries and thresholds position

The foundational idea of this position, that the Earth is a complex system embedding relationships between biophysical and social processes, and that human activities have fundamentally changed the Earth's biophysical characteristics to the extent, that the capacities of the planet to support social and economic development are becoming limited what results in global financial instability and economic inequalities (Rockström, Steffen et al., 2009).

This position developed in the early twenty first century with The Limits to Growth narrative and similar models around economic-ecological systems and their limitations and thresholds. Such areas include for example, human ecology, environmental studies, sustainability science and Earth system science (Rasmussen & Arler, 2010).

This concept puts light on absolute limits to the cumulative effects of human activities, mainly industrial activities, on systemic thresholds to maintaining global stability at the planetary level. The concept is not analysing opportunities created by renewable resources, neither discuss limits of the non-renewable resources.

The concept builds on the anthropocene (Earth geological time) theory and argue, that degradation of particular ecological functions, cause systemic collapses that through feedback loops affect other processes (Rockström, Steffen et al., 2009).

Galaz (2012) argue, that there is an uncertainty zone around a potential planetary threshold and that scarcity of resources relies on the resource uses and patterns of consumption, and that

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societies can turn on the "safe operating mode" supporting crucial social, economic and environmental systems. Steffen (2015) argues, that the growth of the developed countries after the Second World War, was stimulated by the exploitation of the cheap fuel, soil and other natural resources. These resources are not available to 75-80% of the societies, which are hungry for growth and compete with the developed countries for the decreasing access to resources, that result into "global sustainability crises".

The main scientific debates in this paradigm are going around the dilemma of priorities. Some scientist J. Rockström et al. (2009), W. Steffen (2015) argue that the preservation of the Earth, through setting of limitations to the growth and resource usage is the most important issue. When other scientists, M. Obersteiner et al. (2016), R. Lal (2016) argue, that the discussion around over exploitation of the Earth resources is exaggerated and politicized, and the limitations shall be included only, if they do not create barriers to social and economic development of the specific country or region.

The significant shift in the debates occurred after United Nation General Assembly presented "The Sustainable Development Goals" in 2015, where 17 goals and 169 outcomes formed the way, how social, physical and ecological elements of Earth systems shall be managed in order, to reach wellbeing and ecological sustainability till 2030. UN Sustainable Development Goals aims to link social sustainability with environmental challenges and puts light on the need for integrated strategies, tackling the development of the most vulnerable social groups and ecological system.

The concept of boundaries was also applied to some national and international political reports on resource management. The Chatham House (2012) report *Resource Futures* state, that natural resources are interconnected locally and globally through market activities, trade, and environmental processes. The report underlines, that the world faces intensifying resource challenge, as a result, of increase in consumption and prices, coming from the growing emerging economies. The non-balanced hunger for growth may led to "accelerated environmental degradation, greater risks of supply shortages and disruptions, as well as intensified political tensions over control and access to resources" (Chatham House, 2012). The Chatham House reports forecast global future challenges that may cause rapid environmental degradation "social instability, generate mass movements of human population and ultimately trigger political instability and conflicts over access to water and other increasingly scarce resources" (Chatham House, 2012).

The last Chatham House report, 2012 refer that higher rates of investment and improved technology had partially solved the resource scarcity problem. "With the maturation of technologies to access non-conventional gas and oil, as well as the global economic downturn,

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some analysts suggest that the resource boom of the past decade is coming to an end – especially in the extractive industries – and that resource related tensions will ease" (Chatham House, 2017). However, the report states, that the resource trade has grown 50% from a decade ago, and all roads leading to the main customer - China and in the next decade many developing countries like Iran, Vietnam, Turkey, Thailand will become important resource consumers. Therefore, global trends in production, trade and consumption is very close to the next global crises, "only one or two harvests away", if critical interventions and global agreements will not be achieved among significant producer and consumer countries (Chatham House, 2012).

The UN Sustainable development goals followed the line presented by The Chatham House report *Resource Futures* (2012) and highlighted the need for systemic, multidisciplinary approach, interlinking issues of various resources in the scientific research and policy agendas. The new perspective focusing on connections between challenges and resources, contrary to traditional silos-based approach, leads toward more holistic understanding about preservation of the planets ecosystem and sustainable social and economic growth.

The concept of planetary boundaries has a significant seat in the global policy debates, but is criticized by developing countries, which perceive it as anti-growth and development hindrance. The main critic is that the concept does not pay attention to specific diverse and local contexts and that theory-based decisions are not paying attention to the livelihood of the most vulnerable societies and creates uneven conditions and offend people's rights and freedoms.

Number of scientists underline the need not only to unveil links between resources, but also to merge and integrate different sectoral goals and policies. M. Obernsteiner et al. (2016) and J. Rockström et al. (2016) argue, that despite many scientific research, used to design UN Sustainable Development Goals, the main shortcoming is sectoral closure, lack of synergy between actions and agendas and disergart to feedback and feedback loops between the systems. The multisectoral analysis shows, there are synergies, trade-offs, direct or indirect effects and service of specific goals can affect the success or failure of others" J. Rockström et al. (2016).

Obernsteiner (2016) underlines, that identification of the nexus between different goals could be used to design means and action plans for the implementation of the Sustainable Development Goals. Obernsteiner (2016) and the group of scientists identified seven policy clusters, showing set of related sustainable development goals or targets, in line with three mutually inclusive policies (See Figure No 1).

As an example, Obernsteiner (2016) highlights responsible consumption and production goal as a central goal, covering various sectors, international local and regional levels, solving

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environmental and food prices challenges, this way helping to tackle conflicts, resulting from the competition around different resources.

Raworth (2012) highlights, that control and burden over planetary boundaries shall not compromise inclusive development and shall address human rights and basic needs of the society. The scientist proposed a "doughnut" concept, that takes the outer circle, named "ecological ceiling" of the planetary boundaries, beyond which are nine overshoots of pressure on Earth's systems, such as climate change, ozon layer depletion, fresh water withdrawals and etc. The structure then has an inner circle 'social foundation' (Raworth, 2012), where lie the 12 basic shortfalls of human wellbeing, like food, water, energy, housing and etc. Between the two borders lies a "sweet spot" – a space for the regenerative and distributive economy and "the safe and just space for humanity". The task is to apply "dynamic balance" of different goals and policies, in order, to meet basic life needs and human rights and to sustain living ecosystem of the Earth.

Raworth "doughnut" idea, visually presented the tensions and interrelations between human need and the planet needs and attracted a lot of attention expanding the discourse of conversations around resource scarcity themes and inviting interdisciplinary collaboration to design new more integrative ways to solve multiple challenge by identifying acupuncture points.

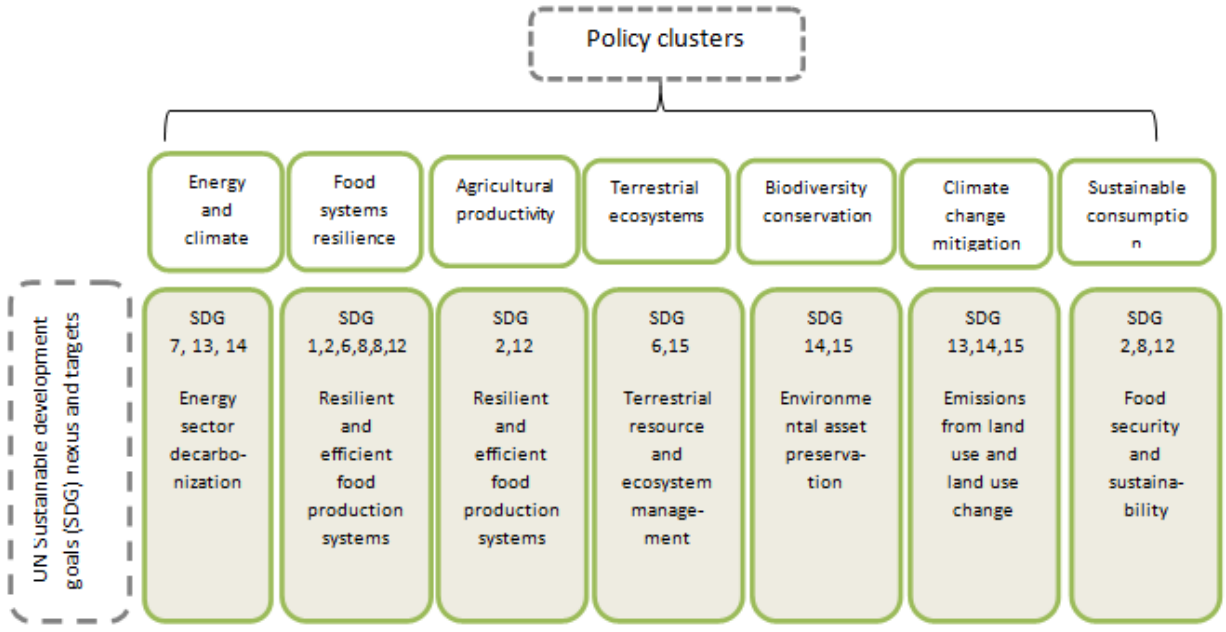

Figure No 1: Clusters of the Sustainable Development Goals

Resource: according to Obernsteiner et al., 2016

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2.2 The technological, market fix and governance position

Representatives of the technological, market fix and governance position argue that investment in technologies, market management and good governance strategies are able to mitigate resource crises without compromising goals of ecological sustainability and inclusive economic growth to the future. The basic idea behind this positing is if growth is assumed to be the way to progress and development, then scarcity of resources that interfere this growth is seen as an obstacle to be solved. This position is broadly represented in contemporary international political discussions and ideas about sustainable development and the Green Economy concept.

These solutions to overcome the resource scarcity usually lie in deploying proper innovation, science and technology. Therefore, the focus shall be driven on the acceleration of technological inventiveness, which may boost the resource abundance, because the key problem is not the scarcity of resources, but not effective usage of it.

In this technologically optimistic perspective for the new "blue revolution" and more irrigation systems for Africa, the biotech revolution, expansion into space and other are being developed and accelerated through social investment initiatives. In the paradigm of this position the concepts of UN *Green Economy* and WEF *Nexus* are being elaborated in different debates, policy documents and the research studies. All three concepts are briefly presented below.

The Green Economy

UNEP launched *The Green Economy Initiative* in 2008 and described it as an economy which improves human well-being and social equity, while significantly reducing environmental risks and resource exploitation. The definition of *The Green economy* integrates social, ecological and economic problems in the perspective of sustainable development, and especially this integration rises many debates.

The perspective of *The Green economy* is oriented around preservation and restoration of "natural capital as an economic asset and a source of public benefits", especially if it relates with the poorest society members, which life conditions depend strongly on nature. (UNEP, 2011). According to the UNEP (2011), the purposes of *The Green economy* is promotion of investments helping to rebuild natural resources, reduce carbon emissions and pollution, enhance energy and resource efficiency and preserve biodiversity. *The Green economy* treats natural resources as a critical element for economic and social development and rely on financial mechanisms that may enable creation of solutions, enabling better resource efficiency and preservation, thus creating a specific market sphere for green innovations. The forecasts are that in 2020 the annual value of *green technologies* will reach 4.2 trillion US dollars.

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Some supporters S. Smulders et al. (2014), G. Kallis, C. Kerschner, J. Martinez-Alier (2012) of *The Green economy* and *The Green growth* represent the radical position, stating, that environmental challenges shall be approached redefining economic growth and market strategies. Fischer-Kowalski & Swilling, 2011 suggests that economic growth should be separated from the growing consumption of material resources such as construction minerals, fossil fuels, and biomass. Kallis et al. (2012) offers to seek socio- economic development and well-being, reducing the growth ambitions and all the surplus or investments primary allocate to green initiatives for sustainable food production and social services.

Number of scientists McAfee (2014), Death (2014), Suckall, Tringer & Tompkins (2014) question the presentations of concept of *The Green economy* for idealisation and argue, that the economic growth and environmental preservation are compatible goals only if natural capital and effects resource exploitation are accurately monetary valued. If such values are not agreed, environmental degradation and resource scarcity will be strongly influenced by market failures and financial negligence (McAfee, 2014).

J. Fairhead, M. Leach, I. Scoones (2012) criticize, that *The Green economy* concept justifies the commodification and "appropriations of land for food or fuel", authors call this "green grabbing". Scientists point out that *The Green economy* concept face main future challenges due to uneven distribution of risks associated with environmental pricing, which may have negative effect for the poor as consumers and producers.

Suckall et al. (2014) highlight, that *The Green economy* triple (social-economic-environmental) impact is poorly investigated and proven, the recommendation on additional pricing for natural resource exploitation does not assess the social discrimination and conflict possibilities. In the light of *The Green economy* is expected the rise of prices on goods and land, which needs to be balanced through compensational mechanisms. Contrary, there is a risk that the benefits of the regulations will obtain the rich ones and people living in poverty will stay outside and even experience worsening of the well-being, for example, when contaminated materials or waste materials is replaced to other territories.

These critical arguments relate to the emerging narrative around "alternative economy" and "solidarity economy". These new concepts of economy invite to seek solutions for social, ecological and economic sustainability challenges beyond the markets, taxation or technological efficiency in the domain of more integrative and transformational policies. The fundamental push, accelerating more integrative approach to the global policy debates was offered by the World Economic Forum in 2008 presenting the Water-Food-Energy *Nexus* approach to the global resource management.

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The resource Nexus

The concept of *Nexus* is the latest most impactful invention in the resource management discourse. It was presented at World Economic Forum in 2008 and followed by Bonn Conference in 2011, World Water Forums, the Rio +20 negotiations in 2012, the Transatlantic Academy in 2011-2012, thus becoming the new term for sustainable development.

The water-energy-food (sometimes including other resources) *Nexus* has emerged globally as a research agenda, policy and governance framework in response to series of interconnected resource crisis of 2000, resulting in food, energy price leaps in 2007 and 2008 and promised to change the way how global resource risks were analysed and planned (Allouche et al., 2014).

Traditionally, the resource management mainly focused on single resource categories and their interplay through the supply chain, starting from natural resource and continuing into processing and distribution and ending with consumption and disposal. The *Nexus* approach and the model (see Fig. 2) overcomes single resource or "silo" approach by highlighting critical links, synergies and trade-offs between different resource.

The Routledge Handbook of the Resource Nexus (2018) defines the *Nexus* as "a set of context-specific critical interlinkages between two or more natural resource used as inputs into systems providing essential services to humans, such as water, energy and food". *Nexus* model as resented in the Figure 2 highlights the cross-resource needs and impacts for decision making and management.

The *Nexus* model enables to identify risks of over-exploitation, shows how synergies of resources can be employed and trade-offs and contradictions prevented and controlled. *The Nexus* approach seeks for more efficient resource management that address multiple targets in more integrated way.

Bazilian et al. (2011) highlights the complexity of this interconnectedness of the resources as well its multifaced impact on different sectors and policies. Bazilian et al. (2011) discuss if a water perspective is primal, then food and energy systems are perceived as users of the resource, but from a food perspective energy and water are inputs, when from an energy perspective, water as well as bio-resources (e.g., energy crops) are generally an input or resource requirement and food is generally the output. Food and water supply as well as waste water treatment require significant amounts of energy.

At the centre of *Nexus* debates is the theme of natural resource scarcity. World Economic Forum in 2008 underlined, that water is related to economic growth through various interconnections: "Water lies at the heart of a nexus of social, economic and political issues agriculture, energy,

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cities, trade, finance, national security and human lives, rich and poor, water is not only an indispensable ingredient for human life, seen by many as a right, but also indisputably an economic and social good unlike any other. It is a commodity in its own right… but it is also a crucial connector between humans, our environment and all aspects of our economic system" (World Economic Forum, 2011).

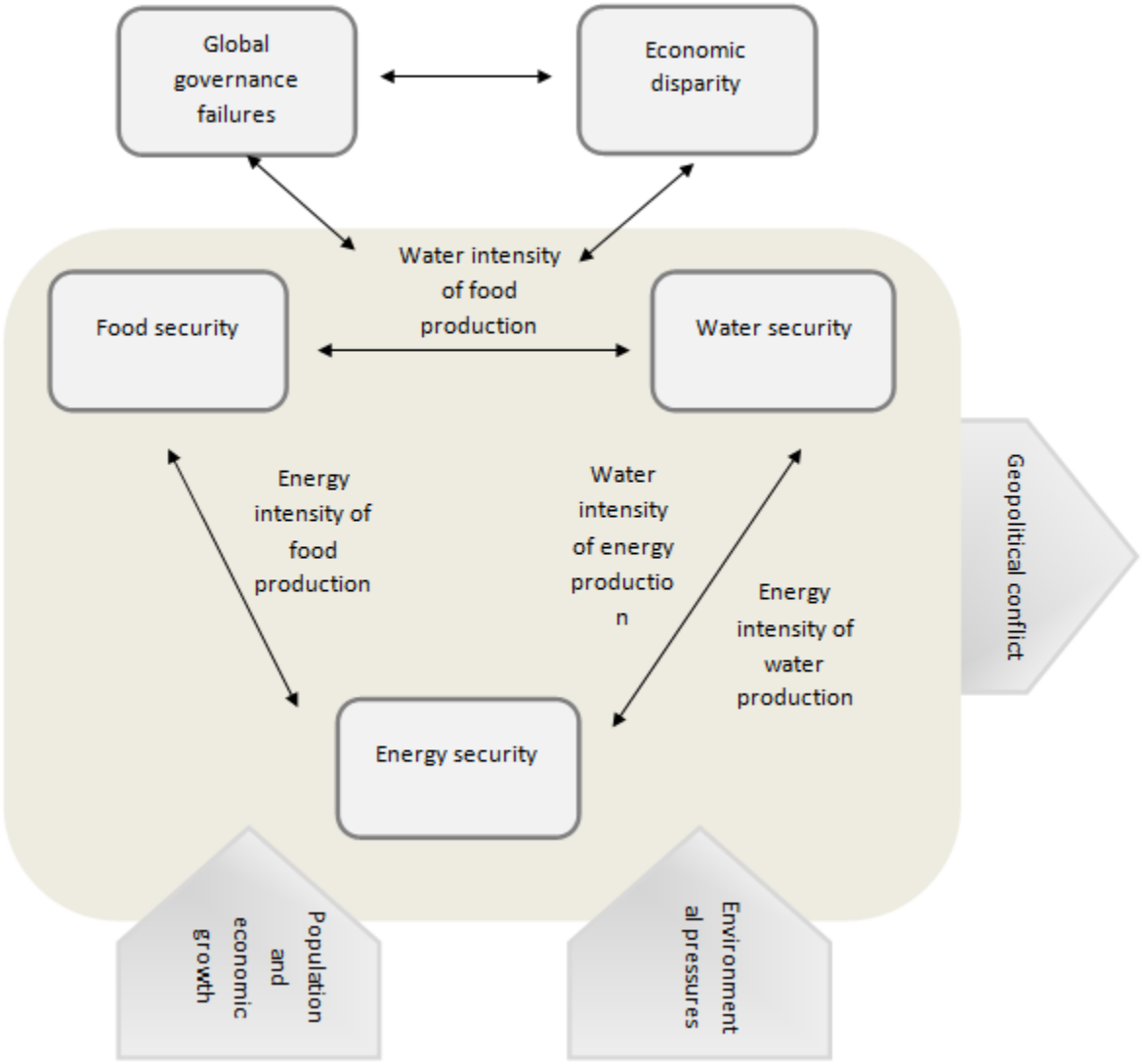

Figure No 2: The WEF Resource Nexus model

WEF Global Risks Report of 2011 underlined, that rapidly rising global population and prosperity are putting unsustainable pressures on resources. Demand for water, food and energy is expected to rise by 30-50% in the next two decades and forecasted shortages puts risks to

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social and political instability and environmental damage. “Any strategy that focuses on one part of the water-food-energy nexus without considering its interconnections risks serious unintended consequences” (World Economic Forum, 2011).

The World Economic Forum *Nexus* narrative for the first time helped to reach public-private agreement with global corporations such as Coca Cola, Nestlé and SABMiller and International Financial Institutions (IFIs) around growth limits (Huff, Mehta, 2015). The global corporations agreed to shift from the traditional value chain perspective toward resources to tackle nexus way of thinking and to participate in creation of public-private strategies for systemic resilience through control and governance of the complex relations and trade-offs between food, water and energy systems (Shepherd, Burian, Liu, Bernardes, 2016).

Nexus approach gained significant support from the emerging Green economy community for putting price on natural resource and physical limitation to resource usage and for market mechanisms for governance of resource scarcity. *Nexus* concept is in line with the of *Green Economy* as both aim to identify healthy and effective ways for growth non-compromising with nature. WEF argues that water places the only natural limit to economic growth. For example, it is 'the single constraint to expanding cities' (World Economic Forum, 2011; NIC, 2012) and it can be overcome understanding and managing complex interrelations between wood-water-energy systems.

The Nexus approach unveils also interrelation between scarcities and constrains on usage of different natural resources, while previously the debates were going around limitations for specific separate resources. In regard, to *Nexus* recent understanding of ecological systems has shifted toward recognizing ecological systems as being in a dynamic non-equilibrium with non-linear responses (Mehta et al., 2016).

The resource *Nexus* complements broader environmental sustainability research, underlying critical links in regard to natural resource management and offers the framework through which negative outcomes of single-sector approach can be reduced and system-wide resource efficiency received, in continuation of *The Green economy* perspective.

2.3 The structural inequality and distribution position

This position relies on the idea, that environmental degradation and resource scarcity is not a natural outcome of growth, but is the result of a faulty resource governance, that created inequalities in access to resources and uneven distribution (Mehta, 2014). This position highlights a socio-political perspective of resource scarcity and refers to the themes of political ecology, political economy and human development.

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This position puts the light on differences and peculiarities, how resource scarcity is experienced at different scales: global, national, regional, community, household. It also analyses the relation of the context and power to the resource allocation and rises questions, how access to and control over resources plays a role in competition and conflicts.

The supporters of the structural inequality and distribution position criticize other two positions, mentioned above, for over-generalization of the resource scarcity problem (Huff & Mehta, 2015). They underline that global debates around resources still focus on trade and production needs and avoid focusing on concrete human-related barriers, such as corruption, inequality, poverty. Scientists state, that conceptual system approach, focusing on biochemical the planet's processes, integrity of global environmental issues and survival of humanity reminds conversations about the forest while taking no notice on the trees. The technological and governance focused solutions seeking to find growth and efficiency, rarely touch themes of unemployment, that are tightly interlinked with economic growth" (Mehta et al., 2016).

Mehta (2005) distinguishes between "lived/experienced" scarcity, which people experience cyclically due the biophysical shortage of food, water and etc., and "constructed" scarcity, which is created through socio-political processes, putting references to more influential actors and leaving the most vulnerable societies outside.

The historian A. Ross (1996) also distinguishes between "socially generated" scarcity, where some social groups experience shortage and others not and "absolute" scarcity, which is experience by all the societies. The scientist argues, that the two kinds of scarcity in public debates are conflated. The close approach, but specifically focused to water was provided by the 2006 Human Development Report 'Beyond Scarcity: Power, Poverty and the Global Water Crisis' (UNDP, 2006) which analysed, how power relations and social status were linked to uneven access to water.

The structural inequality and distribution position unveils the shady side of resource scarcity, that deeply influences on human development, human rights and breaks down the abstract macro-economic perspective to the real-life challenges. Around 80% of the poor in rural areas had no access to water or sanitation in 1994 in South Africa. In India lower caste women are still restricted to access to certain water sources (Movik, 2012).

The position also highlights the causal links between the violation of human rights and the economic, social deprivations, that express and result to poverty (Sepulveda, Nyst, & Hautala, 2012). The supporters of the structural inequality position aim to bring the norms, standards and principles of the international human rights into the plans and policies of the Green growth or sustainable development, especially focusing on their adoption and implementation at the

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national and regional levels. Economic growth, technological development and investment priorities receives pressure for more inclusive resource distribution and creation of access to base resources for the most vulnerable societies.

3. CONCLUSION

The article presents main debates around novel approach to resource scarcity which applies more complex and integrated system approach and seeks to highlight specific causal bonding between different domains and offer interventions not on the particular challenges, but on the leverage points within the system.

The global scientific discussion occurs between three dominant narratives: 1) the planetary boundaries and thresholds perspective, 2) the technological, market fix and governance perspective, and 3) the structural inequality and resource distribution perspective. These perspectives represent contemporary approaches on resource scarcity interlinks to economic or social issues. They also underline the need not only to unveil links between resources, but also to merge and integrate different sectoral goals and policies, because direct or indirect effects of specific goals can affect the success or failure of others.

During recent decades scientists and policy makers emphasize the need for a more integrative approach toward resource scarcity challenge, unveiling interlinks, synergies and trade-offs between different resources, and their interrelation with economic and social outcomes. The new models, such as *Green Economy*, *Nexus or Doughnut* create a shift in thinking about resource scarcity and fuels debates around sustainable economic growth strategies. The *Nexus* model is observed as an example of such integral approach, which highlights critical links, synergies and trade-offs between different resource and seeks for more efficient resource management that address multiple targets in more integrated way.

The contemporary multi-perspective scientific discussion around scarcity challenge leads to

new concepts such as “dynamic balance”, which focus on amalgamation of different goals and policies, tackling tensions and interrelations between human need and the planet needs, and invites interdisciplinary collaboration to design new more integrative ways to solve multiple challenges. Such approach relates to the emerging narrative around “alternative economy” and “solidarity economy”. These new integral concepts of economy invite to seek solutions for social, ecological and economic sustainability challenges beyond the markets, taxation or technological efficiency in the domain of more integrative and transformational policies.

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REFERENCES

1. Allouche, J., Middleton, C., & Gyawali, D. (2014). Nexus Nirvana or Nexus Nullity? A Dynamic Approach to Security and Sustainability in the Water-Energy-Food Nexus: Brighton, United Kingdom: STEPS Centre.
2. Basilian, M., Rogner, H. et al. (2011). Considering the energy, water and food nexus: Towards an integrated modelling approach. *Energy Policy* 39 (12), 7896-7906.
3. Benson, D., Gain, A. K., Rouillard, J., & Giupponi, C. (2017). "Governing for the Nexus," in *Water-Energy-Food Nexus: Principles and Practices* (pp. 77–88), eds. P. Abdul Salam, S. Shrestha, V. Prasad Pandey, and A. K. Anal. Washington, DC: John Wiley and Sons, Inc.
4. Bleischwitz, R., Hoff, H. et al. (2018). *Routledge Handbook of the Resource Nexus*. Routledge Handbooks Online.
5. Boas, I., Biermann, F., and Kanie, N. (2016). Cross-sectoral strategies in global sustainability governance: towards a nexus approach. *Int. Environ. Agreements-Politics Law Econ.* 16, 449–464. Doi: 10.1007/s10784-016-9321-1.
6. Chatham House. (2012). Resources Futures. London: Chatham House, available at: http://www.chathamhouse.org/sites/default/files/public/Research/Energy,%20Environment%20and%20Development/1212r_resourcesfutures.pdf.
7. De Laurentiis, V., Hunt, D. V. L., & Rogers, C. D. F. (2016). Overcoming food security challenges within an energy/water/food nexus (EWFN) approach. *Sustainability* 8:95. Doi: 10.3390/su8010095.
8. Death, C. (2014). The green economy in South Africa: Global discourses and local politics. *Politikon* 41 (1), 1-22.
9. Fairhead, J., Leach, M., & Scoones, I. (2012). Green grabbing: a new appropriation of nature? *Journal of Peasant Studies* 39 (2), 237-261.
10. Fischer-Kowalski, M., Swilling, M. (2011). *Decoupling Natural Resource Use and Environmental Impacts from Economic Growth.* Geneva: United Nations Environment Programme.
11. Galaz, V., Biermann et al. (2012). Planetary boundaries —exploring the challenges for global environmental governance. *Current Opinion in Environmental Sustainability* 4 (1), 80-87.

ISSN: 2455-8834

Volume: 04, Issue: 09 "September 2019"

12. Huff, A, Mehta, L. 2015. The new politics of scarcity: a review of political positionings, current trends and their socioeconomic implications. Institute of Development Studies, UK. *Resource Politics* 2015.

13. Kallis, G., Kerschner, C., Martinez-Alier, J. (2012). The economics of degrowth. *Ecological Economics,* 1-9. Doi.org/10.1016/j.ecolecon.2012.08.017.

14. Kuipers, K., Van Oers, L., Verboon, M. et al. (2018). Assessing environmental implications associated with global copper demand and supply scenarios from 2010 to 2050. *Global Environmental Change 49,* 106-115.

15. Lal, R. (2016). Global food security and nexus thinking. *Journal of Soil and Water Conservation*, 71 (4), 85A-90A. Published by Soil and Water Conservation Society.

16. McAfee, K. (2014). The post-and future politics of green economy and REDD. In B. Stephan & R. Lane (Eds.), *The Politics of Carbon Markets* (pp. 237-260). New York: Routledge.

17. Mehta, L. (2014). Water and human development. *World Development*, 59-69.

18. Mehta, L., Movik, S., Bolding, A. et al. (2016). Introduction to the special issue – flows and practices: The politics of integrated water resources management (IWRM) in southern Africa. *Water Alternatives* 9 (3), 389-411.

19. Meyer-Emerick, N. (2012). Sustainable Cleveland 2019: Designing a green economic future using the appreciative inquiry summit process. *Public Works Management and Policy* 17 (1), 52-67.

20. NIC (2012). *Global Trends 2030: Alternative Worlds*. New York, NY: NIC.

21. Obersteiner, M, Walsh. B. et al. (2016). Assessing the land resource–food price nexus of the Sustainable Development Goals. *Science Advances* 2 (9). e1501499. DOI: 10.1126/sciadv.1501499.

22. Rasmussen, K., Arler, F. (2010). Interdisciplinarity at the human-environment interface. *Geografisk Tidsskrift-Danish Journal of Geography* 110 (1), 37-45.

23. Raworth, K. (2012). A safe and just space for humanity: can we live within the doughnut. *Oxfam Policy and Practice: Climate Change and Resilience*, 8 (1), 1-26.

24. Rockström, J. et al. (2016). The world's biggest gamble. *Earth's Future* 4 (10), 465-470.

25. Rockström, J., Steffen, W. et al. (2009). A safe operating space for humanity. *Nature* 461 (7263), 472-475.

ISSN: 2455-8834

Volume: 04, Issue: 09 "September 2019"

26. Rockström, J., Steffen, W. et al. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society* 14 (2): 32.

27. Ross, A. (1996). The Lonely Hour of Scarcity. *Capitalism, Nature, Socialism* 7 (3), 3-26.

28. Sachs, J. D. (2015). *The Age of Sustainable Development*. New York, NY: Columbia University Press.

29. Sepulveda, C. M., Nyst, C., & Hautala, H. (2012). *The Human Rights Approach to Social Protection*. Ministry of Foreign Affairs of Finland.

30. Shepherd, J. M., S. Burian, C. Liu, and S. Bernardes. (2016). Satellite Precipitation Metrics to Study the Energy-Water-Food Nexus within the Backdrop of an Urbanized Globe. *Earthzine,* doi:http://earthzine.org/2016/05/31/satellite-precipitation-metrics-to-study-the-energy-water-food-nexus-within-the-backdrop-of-an-urbanized-globe.

31. Simonis Udo, E. (2013). Decoupling natural resource use and environmental impacts from economic growth. *International Journal of Social Economics* 40 (4), 385-386. Doi.org/10.1108/03068291311305044.

32. Smulders, S., Toman, M., & Withagen, C. (2014). Growth Theory and "Green Growth"**.** *OxCarre Working Papers* 135. Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford.

33. Steffen, W., Richardson, K. et al. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science* 347 (6223), 1259855. DOI: 10.1126/science.1259855.

34. Suckall, N., Stringer, L. C., & Tompkins, E. L. (2014). Presenting Triple-Wins? Assessing Projects That Deliver Adaptation, Mitigation and Development Co-benefits in Rural Sub-Saharan Africa. *AMBIO* 44 (1), 34-41. Doi: 10.1007/s13280-014-0520-0.

35. Sweeney, S. (2019). The green new deal's magical realism. *New Labor Forum* 28 (2), 74-78. Doi.org/10.1177/1095796019837934.

36. The Guardian (18 Mar 2019). World faces 'perfect storm' of problems by 2030, chief scientist to warn. Available at: https://www.theguardian.com/science/2009/mar/18/perfect-storm-john-beddington-energy-food-climate.

37. UNDP. (2006). *Human Development Report*. Beyond Scarcity: *Power, Poverty and the Global Water Crisis*. United Nations Development Programme, New York.

ISSN: 2455-8834

Volume: 04, Issue: 09 "September 2019"

38. UNEP. (2009). *Rethinking the Economic Recovery: A Global Green New Deal*. United Nations Environment Programme.

39. UNEP. (2011). *Towards a Green Economy Report: Pathways to Sustainable Development and Poverty Eradication within the Backdrop of an Urbanized Globe*. IEEE Earthzine.

40. World Economic Forum. (2011). *Global Risks Report*. Geneva: World Economic Forum.

41. World Economic Forum. (2014). *The Future Availability of Natural Resources: a New Paradigm for Global Resource Availability*. World Scenario Series. Geneva: World Economic Forum.

