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ENHANCING EFFICIENT USE OF BIODIVERSITY-PROVIDED ECOSYSTEM SERVICES DISTRIBUTED OVER RURAL AREAS TO SERVE METROPOLITAN MUNICIPALITIES

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Abstract

Ecosystem Services (ESS) are used inefficiently in cities due to present land-use patterns that have been shaped through centuries. Though ESS are provided by biodiversity in grasslands, forests, wetlands, etc. in rural areas, they are produced in rural lands and are mostly used in urban areas.

Beneficiaries of achieving land consolidation to increase ESS production efficiency are urban dwellers and local economies. This will improve their living conditions in addition to presenting the facility of effective resource management tools to municipalities. In particular, low revenue earning urban dwellers, and the unemployed segment will be the most benefiting parts under recent circumstances.

Launching such an efficiency promoting a programme, each functional ecosystem unit should be mapped to denote provisional, regulatory ESS, including their frequency, overlapping regulatory areas and provisional ESS type per unit area, distances to the city, availability and unavailability due to laws regarding ownership, physical barriers, functional discontinuities. Mapping with data received from Geographical Information System (GIS) would be inadequate, thus we propose to use of LUCAS statistical framework mapping which is carried out in the field, by observing, and measuring the sources quantitatively by relevant expertise reflecting the local economic conditions of farmers.

Keywords: land consolidation, provisional ecosystem services, regulatory ecosystem services, biodiversity, rural areas, municipalities, land use, LUCAS mapping.

1..INTRODUCTION

Both natural and semi-natural agro-ecosystems provide various services for people, including food, fibre, potable freshwater, water mass to regulate climate, wood for heating energy and housing materials. Different land-use patterns and cover changing factors like population and economic expansion, built-up area expansion etc. have forced human beings to convert agricultural land to non-agricultural purposes. Accordingly, in the last years, many natural ecosystems have been converted into farming areas, monoculture plantations, tourism etc., which have caused externalities.

The capacity of delivering ESS essential to social well- being is impeded by climate and land-use change, causing a significant alteration in the quality of functions and services of many ecosystems.

Land consolidation to rearrange the spacing of lands in rural areas to make ESS into the best possible functioning state is required under drought, poor soil conditions, climate change impacts, overuse, and the presently emerging severe social-economic conditions faced by farmers, villagers, and the working class almost in every rural region of the world.

The present landscape pattern in rural lands somehow supports the production efficiency of ESS insufficiently

2.CURRENT SITUATION IN EUROPE AND TURKEY

Until now, spatial planning has been primarily interrelated with cities. It is increasingly becoming clear that the rural regions surrounding built-up areas have an important influence on urban spaces, in terms of climate, energy supply, water management and transport planning etc.

European Union (EU) so far has neglected exploration of ways to reveal how ESS providing areas should be spaced in rural areas to optimize the benefits of urban users and wildlife. Ignored wildlife management practices have resulted in transmission of diseases from wild to human populations, which in turn caused the increase of medical expenses. During the science-policy interface making for the EU Commission (Brussels) period, EU environmental data evaluation and reporting organisations in cooperation with European scientific research institutions have ignored the discrepancies between national economies of EU governments. Such inequalities are usually hidden, but they considerably force the constraints arising from different social-economic classes. Such imbalances in distributing social-economic welfare opportunities can be corrected by a change programme, which gathers ESS producing rural land units to hamper inequity amongst different revenue level owning social classes. That is

why large city municipalities of the EU may launch such innovative programmes in the surrounding rural lands which would serve the cities.

According to Helmholtz Centre for Environmental Research (UFZ) press report(URP 2020), featuring speeches by Federal Minister of Education and Research *Anja Karliczek*, Minister-President of Saxony *Michael Kretschmer* and Lord Mayor of Leipzig *Burkhard Jung*, the two-day conference will also present the new edition of the Leipzig Charter on Sustainable European Cities. (URP 2020).

The first version of the charter was adopted in 2007 by the ministers from all EU Member States responsible for urban development. It called for strategies to strengthen integrated approaches to urban development with regard to the development of urban neighborhoods (Monprapussorn 2018). Likewise, similar speeches have been made by some leading municipalities after June 2020 elections in Turkey. For instance, Ankara mayor Mr. Mansur YAVAŞ, and İzmir mayor Mr. Tunç SOYER has consciously started their new agricultural policies to support rural people by pricing fairly their ESS dependent commodities, while marketing them directly by means of municipal facilities. In other words, they appreciate the real value of rural regions, and the farmers in terms of marketing, noticing that farming products always depend on regulatory, and provisional ESS.

ESS providing rural ecosystems spaced in line with ownership properties, including a reduction in field size originated from inheritance and the present legislation shaped through centuries in Turkey, which have caused inefficient maintenance and use of ESS, particularly in crowded tourist areas around Antalya, Mersin, and Muğla, river catchment basins located in İstanbul, and human settlements areas over lowlands, which are extremely valuable for farming in Karşıyaka, Bostanlı, Bayraklı, and Bornova districts. Nonetheless, local and central governments in Turkey have yet not launched ESS saving projects directly. Similarly, Turkish applied science research institutions called "Teknokent" in Turkish (Technocity – Technopark), have never been interested in developing innovative instruments to receive the utmost level capacity of ESS from rural lands.

The demand for rural land use by the increasing land development enrichment trend recently observed in İstanbul and its surroundings threatens the existence of ESS in river basins. The most striking example is the suppressed potable water provision needs due to ongoing unsustainable land use of river basins, e.g. Ömerli dam, and its surroundings in the water catchment area. Another example is from the water demand of İzmir from Manisa rural regions, i.e. river basin.

Sustainable and resilient - these are the urgent demands that are increasingly being placed upon the well-functioning interaction between town and countryside. Sustainability is important, for example, to prevent global warming and climate change, erosion and desertification environmental pollution by means of an intelligent transport policy, to use existing buildings and spaces efficiently and to minimise the consumption of energy and resources (Monprapussorn 2018).

3.WATER, BOTH A PROVISIONAL AND REGULATORY ESS

Understanding the relationship between water quality and ecosystem services valuation requires a broad range of approaches and methods from the domains of environmental science, ecology, physics, physical chemistry, chemistry and mathematics. The fundamental challenge is to decode the association between 'ecosystem services geography' with water availability, its quality distribution in time and space. This demands the acquisition and integration of vast amounts of data from various domains in many formats and types.

4.CHALLENGES

Land use pattern determines volume, intensity, coverage of ESS in many ways, such as,

i. ESS is generated more efficiently in biodiversity conservation prioritized areas, such as protected areas,
ii. The intensity of unsustainable land use taking place particularly in overlapped urban and rural regions intersections with the highest levels of ESS loss,
iii. Farming in the neighboring areas to resilient ecosystems increase the efficiency of ESS production,
iv. The state of soil is also important for natural habitats continuity, maintenance, and sustaining wildlife,

In general, nature conservationists ignore the state of soil in agricultural areas, arable lands, vineyards, semi-natural grasslands, meadows, and natural habitats where wildlife is the dominant inhabitant. However, the grazing management, tillage, soil compaction and other farming activities are vitally important in generating ESS in natural ecosystems, and protected areas they concentrate solely on them. This attitude towards ESS generation and rural development by the conservationists is one of the challenges of Turkey. In Europe, the situation is quite different as farmers are trained by their cooperatives and European Forum on Nature Conservation and Pastoralism (EFNCP). They reflect ecology in policy development with special emphasis on farmers' conditions which is resulted in ESS protection consciously.

5.METHODS

Urban and rural areas can jointly establish sustainable partnerships for mutual benefit, and this cooperation must be developed by considering current research topics, such as regional circular economies, land use management, digitalisation and dealing with extreme events in the context of urban-regional development. To achieve this task, part of the budgets allocated to urban infrastructure investments should be used for ESS improvement investments by governments and municipalities. This can be achieved by choosing the best fit and the **easiest application method** which adjusts ESS efficiency level in a given rural region by planning land consolidation to the extent that maximise the EES efficiency for the given region.

Although national and local scales have been managed separately by different authorities, as the surrounding rural area of cities are becoming increasingly important for solving problems, so a new pattern of regional development and cooperation is required. The aspiration to give more thought to what lies beyond city boundaries is new," says Sigrun Kabisch, who is also the chair of the scientific advisory board of the EU Joint Programming Initiative (JPI) on Urban Europe (JPI).

In addition, towards attaining a more productive and resilient ecosystem network to provide optimal health conditions for urban dwellers, a new kind of protected areas network in Europe and Turkey should be established in a way to produce the most possible degree of ESS generation. This kind of protected area network should be aligned in accordance with physically connecting the beneficiary effects of the ESS type, which is needed much in that region. For example, if region X is in need of provisional water ESS, whereas region Y fibre and wood, the authority and the common stakeholders will preferentially design the land consolidation pattern towards obtaining Y type ESS to produce fibre and wood most efficiently.

Those rural regions in which agricultural fields, meadows, grasslands, human settlements, tourist places dominate, instead of grasslands, vineyards, meadows, and wetlands, the people of the regions will serve less ESS to the city interrelated with the rural lands. This weakness will lead to receiving less ESS in terms of quantity and intensity in the urban centre and will cause poverty.

Basically, biodiversity and ecosystem resilience level can be enhanced by restoring degraded natural ecosystems, and ecosystems which have already gradually being converted into artificial ecosystems due to invading urban activities in rural lands. This is not so easy, because saving natural resources are still not measured and reported per rural region which feeds the central urban areas. To remedy this problem, Turkey should use LUCAS mapping method to determine the consumption level of resources in advance of reaching the city centre (LUCAS 2020).

Which landscape pattern produces more of the desired ESS types for the given city can also be determined by establishing a one-to-one correspondence between each kind of landscape grids per desired ESS type for that region. This planned, well-targeted spacing of ESS via appropriate land consolidation methods will increase the efficiency of the overall cumulative effect of ESS produced in the vicinity of urban centres. They will be used by the urban population living in the central core and peripheral parts of big cities. Moreover, such economically and ecologically calculated measurement techniques will resolve social problems occurring in society, especially in crowded cities, where the population of poor people is big enough.

6.RESULTS AND CONCLUSIONS

The productivity and sustainability of a wisely selected land-use system is determined between variou6.s land resources, climate and the human activities shaped by the social-

economic system implemented for each country. As the undesired climate change impacts, exponential world population increase, unemployment, and the globally collapsing economic system urge us, countries and unions like European Union, and international organisations should be transforming themselves from the descriptive age to measurement era.

The Common International Classification of Ecosystem Services (CICES) developed from the work on environmental accounting undertaken by the European Environment Agency (EEA). It supports their contribution to the revision of the System of Environmental-Economic Accounting (SEEA) which is currently being led by the United Nations Statistical Division (UNSD).

At present, CICES has been aware of by many international organisations and leading western and eastern countries. However, they somehow have stayed still in an inactive, and reluctant state, do not try to build up an ESS based management models for governments, and municipalities. They have repeated the same descriptive classification systems each day in a more detailed manner but try not to introduce this knowledge into ecological informatics, government and municipality management. As a result, a big gap between recent findings of science and the governance methodology of governments and management of natural resources and urban dweller population by municipalities, and other public institutions arise (Yan at al. 2016). In the last years, the number of science-policy interface bureaucrats, and academicians who have content themselves only with data evaluation, assessment, and reporting, have been increased enormously in western countries, particularly in European Union which has been followed by Turkey through EU membership negotiations. This increment has paralysed the use of concrete measurement, calculation techniques to cope with local resource management challenges. Turkey and the EU should fill the gap between science, science-policy interface, and governmental and municipal management as urgently as possible.

As valuation, pricing of real estate, luxury human settlements construction, banking, and finance sector favoured by the rich social classes, incorporation of natural resources, and assets into national accounting system could still have not achieved after valuing, pricing of natural resources. In other words, priority given to financial resources has shadowed the primary importance of sustainable management of ESS for years. The consumption patterns of certain social classes in such developing countries and Europe have deprived of the public from a carefully managed resources economy. Meanwhile, as scientific measurement and calculation techniques are overlooked, financial sectors, namely banking, stock exchange, the emergence of land development rich class and so on have suppressed more efficient use of ESS, and more easily overshadowed government and municipality infrastructure at the expense of ignorance of big populations living in crowded cities. For this reason, land consolidation to save the highest possible level of natural capital in terms of ESS efficiency maximizing has the utmost importance to sustain both natural resources conservation and keeping society calm in welfare by means of providing equity. In fact, presently each country has expressed its economic situation by listing its natural resources quantitatively with the financial sources.

Land consolidation in accordance with properly spaced ESS in line with city services, such as transportation, water sharing, heating, including spiritual, cultural ESS orderly spaced integrity will improve also tourism, farming, nature conservation, revenue fair distribution of the city at hand. This overall gain will restore imbalanced revenue distribution amongst economic welfare classes in cities for the sake of protecting low revenue gainers, and the middle class who have presently been suppressed by the rich. After properly spacing ESS via land consolidation, payments for ecosystem services (PES) in such countries can hamper social class discrepancies while serving an increased level of ESS to municipalities for the sake of urban dwellers.

Further studies for the benefit of Ankara, İzmir, and İstanbul municipalities to exploring efficient ways of rural resources should be carried on by scientific organisations and science policy-making bureaucracy centres without any delay. Such studies are extremely important in advance of sustainable use management of urban resources located in rural areas by means of sophisticated computations. The government will benefit from the municipalities' and European Union's experiences to extend this policy implementation tool to satisfy national-level economic use of sources in this severe climate change induced source shortage era.

So resilient rural area ecosystems properly managed by urban municipalities will provide sustainable cities for the sake of big human populations. That's why big city municipalities should manage also rural areas besides downtown, in accordance with ecosystem management methods usually implemented by protected area agencies.

Present ESS spacing in rural regions has caused loss of various kinds of ESS in huge quantities which in turn has resulted in relatively expensive water prices for domestic and industrial use. Pricing of water used in cities does not take into water retention capacity, and resilience keeping maintenance costs in the rural. Likewise, fruits and vegetable prices in cities do not reflect regulatory water ESS costs. Combined with extreme living expenses for biodiversity-related agricultural works carried out by the farmers, conserving and maintenance of soil are extremely difficult. This challenge caused a nearly collapsed soil water system managed by farmlands which in turn caused decreased amount and quality of water ESS, and water needing provisional food ESS for the benefit of both wildlife and urban dwellers. To overcome this externalisation, the actual cost of ESS should be reflected to the market prices of fruits, vegetables etc. in order to support the livelihoods of farmers. This can be achieved by Ankara, İstanbul, and İzmir Municipalities, and the Finance Ministry for the benefit of the Turkish economy.

Regarding water ESS pricing, Ankara and İzmir Municipalities have kept household water consumption prices cheaper enough, whereas the private sector value higher prices for bottled drinking water. That means that the private sector never considers the expenses of farmers, and villagers in providing water retention in rural areas to keeping the water budget constant in water catchment areas, thus never consider emergence, production, maintenance of water ESS. In case of villagers, farmers, and farming workers abandon rural lands due to suppressed agriculture under global financial market conditions. With the result that we propose water

and other ESS valuation, and Payment for Ecosystem Services should be determined by big city municipalities, instead of the private sector.

The correlation between the costs of ESS generated in ecosystems in rural regions and the national taxing system, through eliminating negative economic externalisations should be evaluated and incorporated into the national accounting system to decide new taxing system. Governmental organisations and private information technology, databases management, and operational research companies working for them can achieve this task.

7.References

LUCAS (2020) - Land use and land cover survey, EUROSTAT, 2020, https://ec.europa.eu/eurostat/statistics-explained/index.php/LUCAS_ _Land_use_and_land_cover_survey

Monprapussorn S.,(2018)Impact of climate and land-use change on ecosystem services: A case study of Samutsakorn province, Thailand, Ecological Informatics, Volume 47, September 2018, Pages 45-49, 2018, https://www.sciencedirect.com/science/article/abs/pii/S1574954117300481,

UFZ Environmental Research Press Release, 23th November, (2020), https://www.ufz.de/index.php?en=36336

CICES Ecosystem services classification, https://cices.eu/, (2020),

Yan W., Hutchins M., Loiselle S., Hall C.(2016)An Informatics Approach for Smart Evaluation of Water Quality-Related Ecosystem Services, , © Springer-Verlag Berlin Heidelberg (2016),https://www.researchgate.net/publication/326860332_An_Informatics_Approach_for_Smart_Evaluation_of_Water_Quality_Related_Ecosystem_Services,

URP 2020 "Looking beyond city boundaries" International conference hosted by UFZ on the relationship between urban and rural areas.Helmholtz Centre for Environmental Research (UFZ) press report press release, 23. November 2020 https://www.ufz.de/index.php?en=36336&webc_pm=57/2020

JPI Urban Europe Project – the knowledge hub for urban transitions https://jpi-urbaneurope.eu/#:~:text=JPI%20Urban%20Europe%20welcomes%20the,from%20various%20disciplines%20and%20sectors