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Transformation of Agricultural Operations to the Modification of Technology and Science

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Abstract

The majority of food supplies are provided through horticulture, which also provides a significant number of environmental services. Horticulture is essential for ensuring food security in this way, and it also helps Other SDGs. Several studies aimed at improving food and health safety in terms of agricultural land frameworks have been published in different research titles in different parts of the world. The diversity of the agricultural examination literature necessitates an interdisciplinary and thorough systematization of the numerous ways, sizes of investigations, and references utilised together with the various exploration bearings.

Due to global human progress, farming is now the most common form of land across the board. The rapid population growth and rising food needs are hastening human influence on the environment. In order to examine and Key thrust (D), stress (P), condition (S), impact (I), and response (R) (DPSIR) system approaches to assess agricultural impacts on land use, climate, and environmental management was used. .. Ideas for connections between various large impacts, pressures, conditions, effects, and responses were presented using the DPSIR model centre pointers.

Keywords: Technology and Science, Agricultural Operations, land use, climate change.

1. Introduction

Earth's land use and land cover patterns reflect the relationship between human activity and the natural habitat. Land shortage, All conversions from wild land to horticulture and other uses are driven by population growth and intensive land use. It is clear that anthropogenic factors have a significant impact on land use and land cover changes. The new era is called the artificial era, especially for the past 100 years, due to the great human influence. Due to rapid population growth and increasing food demand, human impact on land

and other natural resources is increasing. Increased agricultural energy puts pressure on land resources and the entire climate system. Due to these factors, farming is a high priority for both financial and natural strategy.

The majority of food supplies are produced on agricultural land, which also provides a variety of essential environmental services (giving food, fuel, fiber). Primarily, Cultivated land directly or indirectly contributes to the production of 90% of the animal's dietary calories and 80% of protein and fat. As a result, agricultural areas are contributing to the achievement of the SDGs and food security. In addition, horticulture is essential to rely on, relate to, or tackle other SDGs, especially when practiced economically. For example, it is important to reduce poverty, increase public wealth while supporting information and R & D, increase energy efficiency, interest in productivity and renewables, and increase water quality. In addition, it is important to improve ranchers' working conditions and their use of resources, support a limited range of ranchers, promote progress and engage in fair exchange between producers and consumers. Agriculture reduces the effects of common risks and pollution, ensures food security, and improves urban habitability and access to green areas (such as urban kindergartens and rooftop greening). Agricultural-friendly practices contribute to the effective management of natural resources (soil and water), reduce food waste production, reduce greenhouse gas emissions, and mitigate the effects of climate change-related events and pesticides. Use and reduce surface water pollution, intensive agricultural practices (deep cultivation, pesticide application, deforestation, land degradation, etc.). Conflicts can be caused by unrealistic agricultural business practices that can lead to asset fatigue and devaluation of land. This is very important for the CEO to have better farmland. Nevertheless, interdisciplinary research is needed for this to be fully functioning.

2. Main research fields from an agricultural land system perspective

2.1. Dynamics of agricultural land system

The investigation area with the most dispersed articles was the components of the agricultural land structure (28 percent). A few pieces of art have been produced that identify, represent, screen, direct, and model agricultural land. Two primary systemic headings existed: 1) Spatial and temporal enlargement or contraction of agricultural land regions across time and space A number of primary driving forces and processes, functioning alone or in concert, were identified and examined in light of varied circumstances. They are mostly related to how local and public financial business sectors operate, segment patterns, Environmental factors and internal and external precautions. These drivers are combined in various land use models (SLEUTH, cellular automata, Markov chains, etc.) to model spatiotemporal land changes and predict future agricultural land changes. 2) Mapping and / or investigating farmland in different temporal and spatial dimensions For example, some publications collect and analyze continuous information to capture crop expression, crop nitrogen stress, and farmland. Focuses on pivots and cultivars, as well as crop yields. Multi-sensor philosophy. Overall, past, present and future agricultural land elements are geographic data frames (GIS) and different types of information (equidistant detecting information items, verifiable and factual information).

2.2. The efficiency of agricultural systems

The second area of the survey focused on the efficiency of the agricultural framework and more articles were selected (27%). Much research has been done on the effects of many factors (such as nature and humans) on agricultural land productivity and food production. The most frequently mentioned throughout the text are agricultural production (net yield or yield from cultivated land), yield (yield per unit area), and agricultural efficiency (wages paid per unit area). There are three indicators. Or the individual used, eg the market value of the last result). The terms "agricultural effect" and "agricultural efficiency" are used interchangeably. This is explained by the fact that agricultural efficiency is associated with useful areas of total agricultural survival effect (calculated by yield per unit of information area (called yield)). Therefore, agricultural productivity is a component of agricultural effect and is a broader concept expressed in terms of crop productivity per unit region or other data source, or food quantity per unit region. These actions are fundamental and functional components on the formation of agricultural land at different scales.

2.3. Effect of climate change in agriculture

The effects of climate change on horticulture were the subject of 16% of the articles selected. Currently, a few studies evaluated both Short-term and long-term changes in climatic conditions and their impact on agricultural framework conditions that take into account various modeling tactics. Using the effects of individual variables within these case groups, we assumed a geographical distribution of changes in crop production and agricultural efficiency in some parts of the world (Europe, Africa, Asia, etc.). Similarly, the importance of the situation mimics the impact of future situations by recognizing the current relationships between factors related to the impact of climate change on agricultural land and by considering possible future stories. .. In general, this approach involves quantifiable recovery models, biophysical and process-based agricultural environment models, and scale- and climate-specific models to assess agricultural output.

2.4. Land suitability for agriculture

Agricultural land reasonableness was the subject of 7% of the selected papers. These articles mostly concentrated on identifying suitable horticultural regions and developing specific agricultural food-grain crops. The research strategies employed in this subject were centred on geographical scientific Procedures for identifying many factors that affect land suitability (geography, soil characteristics, climatic characteristics, economic factors, etc.). Expert opinion is usually used to assess the seriousness of the problem. Logical ordering process (AHP) and weighted direct mixing are two examples of the most widely used multi-rule evaluation (MCE) approach (WLC). For example, it is possible to integrate at least two strategies. According to FAO's Land Compatibility File, the main output of the survey is the land compatibility map of the farmland, which is usually divided into four groups (not appropriate), barely reasonable, respectably appropriate, and extraordinarily appropriate).

2.5. Geospatial data, spatial analysis, integrated models, and interdisciplinary research

Frameworks for Agricultural land depend on various ecological and economic factors that interact with it. As a result, it is a dynamic and complex socio-ecological structure that needs to be carefully studied to ensure its viability. For this reason, interdisciplinary methods are needed to study the frame of agricultural land on various temporal and spatial scales.

Undoubtedly, R & D activities include theoretical foundations, multi-temporal and multi-sensory innovation, GIS technology, situational improvement and research, land-use modeling, agricultural finance / stock exchange representation, and geospatial data. Department SDG. For example, many SDG goals are linked to geospatial information. Accessibility, timing, spatial awareness, and accuracy of information are important for tracking the achievement of the SDGs in different countries. Long-term datasets can also help establish a more informed baseline across different logical disciplines, especially those related to food security, or for developing land-change and climate change models. In order to work on the ongoing information and reasonable open new questions that should be attended to in distinct geological and temporary situations, upgrades in information assortment, systemic advancements, and powerful models are also essential.

3. Results and discussion

3.1. Driving forces

Conditions have been created to cover the increase in food demand from the growing population as a whole. Horticulture is a common type of land use around the world as the agricultural biological system occupies more than 40% of the earth's surface due to the global expansion of the population. Rural areas and agricultural landscapes are interrelated, with almost half of the world's population living there. Agribusiness typically provides employment for 2.5 billion people in this rural population. In this way, population and land usage are seen as the actual driving forces behind farming. In addition to these primary drivers, the EEA also identified what are known as the "external and internal primary drivers" based on market trends, technological advancements, social changes, and organisational structures.

3.2. Land use

A key Land-use change reflected in land cover are the driving force behind global natural change that affects climate, biodiversity, environmental management and influences land-use decisions. Numerous interrelated factors continue to contribute to land-use change. Combination of primary land use changes forces fluctuates in the present. The stress resulting from excessive demands on land resources is amplified by profoundly altered biological system circumstances generated by climatic variations. A variety of criteria, including financial ones, directly influence the orientation of land directors. On-land employment markets and functional cycles are influenced by technology.

3.3. Pressure

In some parts of the world, farming has recently progressed from self-sufficiency to excess. Then, as major patterns in European or North American agribusiness, change was connected to escalation and specialisation of creation, along with unfavourable effects to the environment. Agricultural expansion is defined as a higher level of information source and more production of commodities produced or grown per unit space and time. Because of a vital growth in the yield of big harvests, agricultural creation has increased in recent years by a factor of to multiple times.

3.3.1. Intensification and specialization of agriculture

For a very long period, escalation and specialisation have dominated Trends in EU countries including Slovakia. Between 1965 and 2000, nitrogen treatment increased 6.87 times, phosphorus reserves 3.48 times, irrigated land area increased 1.68 times, and land area under development increased by a net 10%. Looking at specific markers such as compost consumption and animal thickness, there is a clear increase in Europe compared to other countries (Figures 1 and 2). During the communist era, the largest increase in Slovakia reached the 1980s. However, since around 1990, there are signs of a trend towards more effective use of agriculture. contributions due to both the implementation of various ecological measures and the fact that homesteads' financial situations are not always favourable.

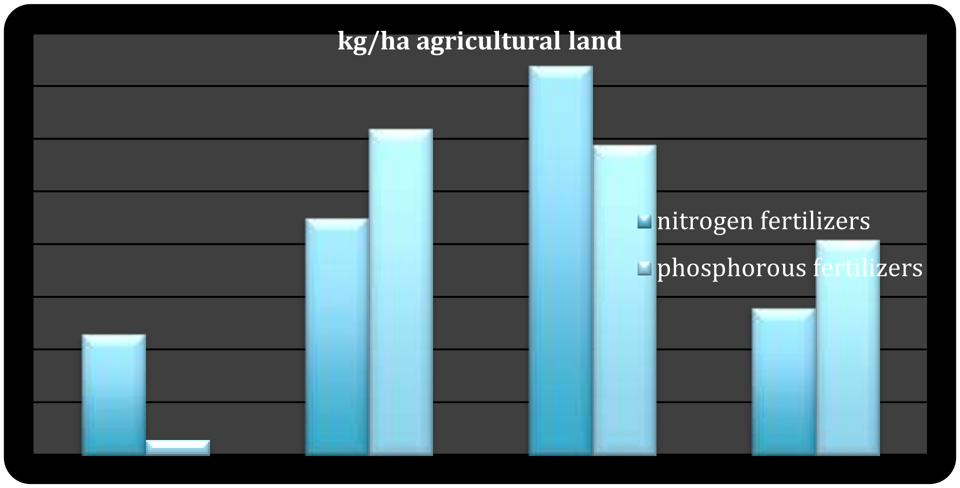

Figure: 1. Fertilizer consumption in 2012 (kg/ha of agricultural land) (based on data from OECD.

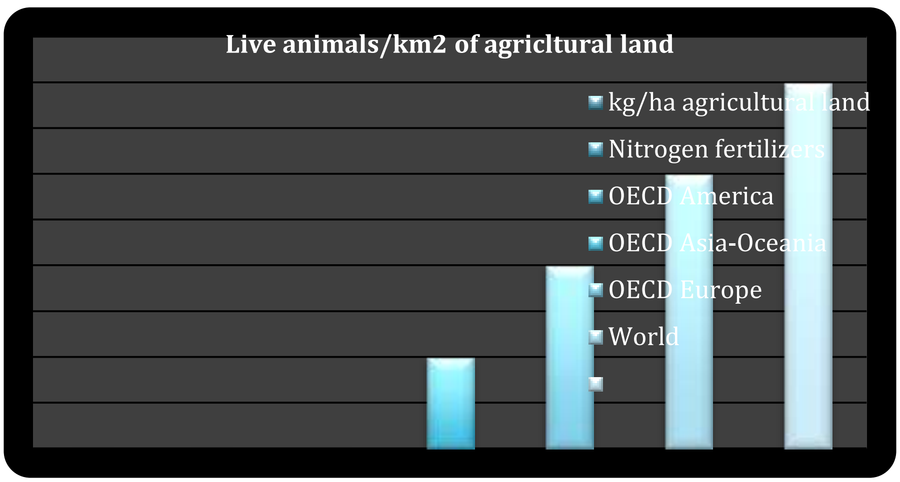

Figure: 2. Livestock density in 2012 (live animals/km^2 of agricultural land) (based on data from OECD.

3.4. State

The majority of harvest and field land around the world is compromised by serious administrative practises in horticulture that increase land corruption rates. Every year, Over 12 million hectares of farmland worldwide have been severely devastated and abandoned. The extended pressure is associated with deteriorating climatic conditions, especially soil and water.

3.4.1. Soil

The most fundamental resource on ranches is soil. The board rehearsals have an unmistakable impact on quality when it comes to offering biological system administrations. By using information on soil contamination, disintegration, and compaction, it is possible to assess the state of the soils.

The term "soil tainting" refers to an abnormally high clustering of a chemical in soil. By introducing contaminants or harmful compounds like cadmium through the use of mineral phosphate manures or natural poisons through the application of pesticides, Agricultural activity contributes to soil pollution. Comprehensive inventory and data sources for regional and widespread soil pollution are scarce at the global or regional level. According to the instrument, almost 15% of EU-27 has a surplus of 40 kg N / ha or more. Only 0.4 percent of Slovakia's total land cover is contaminated with heavy metals according to data from soil observation. Human activities have significantly increased the soil shortage on land surfaces due to soil disintegration. Around 10 million acres of agriculture are destroyed each year due to soil erosion.

3.5. Water

Water pollution both results from and is caused by agriculture. The evidence supporting increased Nitrate and phosphate concentrations in farms, drainage channels, streams, rivers and lakes are fragmented and often specific to a particular region or situation. By the end of the 20th century, the global flux of phosphorus to the sea had tripled to about 22 Tg annually.

The most prevalent chemical contamination in aquifers across the globe is nitrate. According to a 1990s estimate for the continental USA, up to 25% of applied agricultural nitrogen is lost in gas form and only about 20% of it returns to the water. Since 1990, the average nitrate concentration in streams around the world has increased by roughly 36%.

3.6. Impact

Influences Often the result of a lot of stress. Horticulture puts pressure on the environment, which has both positive and negative effects and can have both positive and negative effects on nature. Agribusiness impacts on climate occur on a site-specific scale, but can have impacts on a local to global scale because to the considerable variation in cultivating frameworks and practises throughout the world, as well as differing ecological features.

3.6.1. Contribution to climate change

The normal motions underwent alterations as Due to artificial land use activities and changes in land use / covering. Land cover changes are responsible for surface and vegetation changes that change the surface albedo, and thus for surface and atmospheric energy exchanges that affect the region's climate. Land-use changes are changing as terrestrial organisms play an important role as carbon sources and sink the carbon cycle.

At the Liptovská Teplika cadastre concentration in the area, 10 top-to-bottom estimates In May 2014, 5 cm and 25 cm soil thermometers were completed on four different land use plots (AL, arable land, M, hilltop, AG, abandoned grassland, FL, forest) (Table 1).). The most prominent average surface temperature was recorded at a depth of 5 cm (4.6 ° C) in Alabama and the lowest at a depth of 5 cm (3.5 ° C) in Florida. Estimated data highlight the importance of plant coverings and the ability of their microclimate to affect soil temperature.

Depth (cm)	**Land use**			
	Arable land	**Meadow**	**Abandoned grasslands**	**Forest land**
5	5.7	3.2	2.1	4.6
25	5.4	3.6	2.7	4.2

Table: 1. Actual soil temperature in cadastre Liptovská Teplička in May 2014 (°C).

Agribusiness it is unique in the economic sector as it emits greenhouse gases and contributes to climate change. In fact, agricultural activity provides both a large sink and source of carbon dioxide. 13.5 percent of all greenhouse gas emissions worldwide are attributable to agriculture. Agriculture is fully dependent on the weather, along with a few other common factors. Each climatic change has both immediate and long-term effects. For ranchers, climate change increases risk and unpredictability due to increased aridity brought on by global warming, changes in precipitation patterns, and an increase in the frequency of extreme weather events.

4. Conclusion

Around the world, farming is the most common type of land use. Future land use, climate, routine resource management, and biological system management are under extreme stress as a result of rapid population growth, which is the primary driver behind rising food demands. We were able to examine selected pointers that had cause-and-impact relationships between the financial, social, and ecological domains thanks to the DPSIR system approach.

Changes in land use and cover are occurring at a faster rate now than they have in recent memory. Growing food consumption has led to farmland expansion in many emerging economies and developed economies. The foundations of agriculture are steadily strengthened. In developed countries, industrialization, urbanisation, and private usage of land have recently joined the monetary development. Broad horticultural types that were previously utilised mostly In Europe and North America, it turned into industrial agriculture, which was accompanied by strengthening and specialization. Composting, pesticides and non-renewable energy sources all make significant and complex contributions to climate change. Agribusiness releases large amounts of greenhouse gases and smelling agents into the atmosphere. It is the main consumer of freshwater resources. Sound management aims to accelerate the deterioration of soil, water and land. Climate impacts begin on a site-specific scale, but can spread from local to global. Land cover changes lead to the disappearance of traditional agricultural landscapes and cause vegetation changes that negatively impact the region's climate, carbon sequestration and biodiversity. The normal systems and biological system administrations that people rely on are also impacted by farming.

A "same old thing" farming strategy is most likely not a viable option in the future because to issues related to greater climate stress, normal assets, and climate change. Another strategy that strongly emphasises the complementarities between the financial, social, and natural aspects of manageable turn of events is green development. Therefore, the main task of future farming is to transform it into a highly effective yet controllable structure that can be effective for a very long period without having a negative impact on the natural resources that support agricultural efficiency.

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