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"Environmental Change Reform and Strategic Planning for Sustainable Development of Agriculture"

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Conclusion:

The historical relationship of progress between agricultural development and production improvement processes has evolved into several strategies. Crucially, these add to the diversification of agricultural activity and agricultural production known as agricultural added value. Agriculture is an opportunity for the Kurdistan Region (KR), and the development of this sector will parallel the various needs for investment and employment. In order to activate this sector, and in order to achieve a healthy goal and have a complete plan and strategy for the agricultural sector (AS). According to SWOT, we must first identify the obstacles and problems facing the AS, reinforce the strong points, and then identify solutions to the obstacles and problems that environmental changes have had a direct impact on sustainable development in the agricultural sector and water resources (ASWR). The proposed reform and strategic plan 2025-2029 includes the main and sub-programs in various sectors of the sector and to enter the next steps, it should be followed in a comprehensive framework of reliable policies, tactics, and mechanisms to address environmental changes and water resources.

Keywords: Economic growth, Reform, Strategic planning, Sustainable development, Policy, Environmental change.

Introduction:

The new investment environment and security that the region enjoys, in addition to the extensive reforms to prevent further corruption and efforts to amend the investment law, will undoubtedly be a great incentive to start preparing this agenda. This is based on great international experience by drawing on successful experiences and correcting previous opportunities in the "Strategic Plan for the Agricultural Sector in the KR 2009-2013". The fact this agenda addresses one of the most important complex issues which hinders the development process in most developing countries, is represented in the confusion of clearly defining the economic system and activity.

Agriculture is one of the most important economic activities in the world, despite the fact that the contribution of the AS to GDP is low and does not reach (10%), it is the biggest sector in attracting jobs and the strongest sector to stand on the country's food security and maintain economic, social and political security. There is no doubt that the KR has suitable and fertile land with an area of about (6) million dunams, which is (46.5%) of the total area of the region.

The overall framework of the study includes the following paragraphs:

Importance of the study: It is to shed light on the reality of the AS, especially the environmental impacts in the KR and investigate its direct impact on economic growth. Additionally, to identify areas of weakness in order to address the shortcomings and negatives that adapt to environmental changes, especially with the economic and technological development the world is witnessing, based on cognitive development with policies and mechanisms to address the obstacles facing this sector.

Research Problem: Poor environmental changes cause agricultural backwardness, which is due to administrative backwardness and increased costs of production and marketing, while the countries around the region either have a good experience or support agricultural investors in these countries, to compete in the markets and drown our domestic production. They are well facing the barriers to change environmental climate changes.

Therefore, in this study, we shed light on whether or not the policies and mechanisms to address the barriers facing the ASWR in environmental changes that lead to increased economic growth and subsequently contribute to achieving economic prosperity. This is a real justification and problem that needs to be studied.

Research Hypothesis: Environmental changes in the ASWR have played a positive role in achieving the highest rate of economic growth in general and in the KR, in particular.

Research Methodology: The researcher relied on a comprehensive approach that covered all aspects and used detailed thematic analysis through SWOT analysis, descriptive, deductive, analytical, and historical methods to analyze and interpret past events and identify their causes. The researcher also used descriptive tools based on data, statistics and detailed information about the actual situation and an attempt to predict the future.

Previous research and research sources: The information and data required for the study were collected from field sources and generally relied on the following sources:

A. Taking advantage of the shortcomings in the Strategic Plan for Agriculture in the KR 2009-2013 and the budget plan for the work of the Strategic Plan.

B. Based on documents and reports from the Ministry of Agriculture and Water Resources (AWR), the KRG Statistical Board, USAID-RTI, World Bank, UNIDO, trade unions and associations in the KR in recent years.
C. Also, using politicians, university professors and local and foreign experts in the field of economic strategy in general, agricultural and water resources strategy in particular and experts and managers of the Ministry of the KR, current and previous years.
D. Conducting four open symposia titled "Industrialization and sustainable development" in Erbil, Duhok, Sulaimani and Halabja provinces, in collaboration with provincial universities / College of Agricultural Engineering Sciences from 15/8/2023 to 1/11/2023.

Purpose of the study: in formulating and reviewing sustainable agricultural economic strategies, consider achieving the best practices that have been predicted for the obstacles to future agricultural development, taking into account the sustainable development goals, and the objectives of the study, as follows:

- Identifying obstacles and problems facing (sustainable development).
- Determining the objectives of the development.
- Explain the problems and challenges of environmental change and propose appropriate policies and mechanisms for their solutions.

Scope of research: The study covers the period (2025-2029), and the KR takes its spatial range for the applicable purpose.

Research Structure: The study is dealt with by dividing it into four main axes. First: The importance of the AS, second: the obstacles and problems facing (sustainable development), third: the goal of developing the ASWR, fourth: policies and mechanisms to solve the obstacles facing the sector.

The paper concludes with a number of conclusions and recommendations.

First: The importance of the agricultural sector:

The market economy in the KR operates in such a way that there is little opportunity for the government to intervene in the operating system. The government's duty to the domestic trade is nothing more than supervision limited to weight control, expired goods, health conditions in occupational settings etc.

Allowing imports when domestic prices rise, preventing imports and imposing additional tariffs on imports when necessary to support domestic production has been the best way to balance prices in the market.

Food price inflation in the KR markets in 2022 was lower than in neighboring countries and most countries in the world. The increase in market prices after March 2023 was mainly due to Iraqi fiscal policy, which had a negative impact in central and southern Iraq.

According to the reports of the KR Statistical Board, in 2022 the average inflation in the region was (7.1%) and for (271) food products (7.6%) compared to 2021. In other words, inflation in the KR for non-alcoholic beverages was (39%) lower than the average of European countries, (45%) lower than the Arab countries of North Africa and (14%) lower than the central and southern regions of Iraq. Overall inflation in March 2023 decreased by (4.9%) compared to March 2021 and food inflation by (2.3%). (Office of Coordination and Monitoring, Kurdistan Regional Government (KRG), 2023, pp. 294-295.)

1. Agricultural Sector:

The beginning of civilization began with agriculture. Agriculture has been the nerve center of the economic process of human life for a long time in human history, even now, when humanity has changed significantly, agriculture has not lost its importance, while it is very important and difficult to replace, because:

First: agriculture is the main source of raw materials for many other industries, so it is very important when we talk about the development of agriculture, we should not only talk about agriculture itself, some kind of links should also be established with agricultural products and other economic sectors such as industry, tourism, etc. Hence, after the domestic needs are met, we can think about using it in foreign trade, which will eventually play a major role in national and personal income.

Second: agriculture plays an important role in mobilizing labor and reducing unemployment. For example, in many oil-rich countries, the AS contributes significantly to the mobilization of human resources, accounting for about 20% of all labor mobilization. Although agriculture appears to contribute little to GDP, it contributes more to reducing unemployment. This suggests that the AS has not only lost its charm but also has its own importance at the socio-economic and political levels.

In the current situation in the world, such as global instability, the war in the Middle East, the war between Ukraine and Russia, the wheat, food and grain crisis, and the possibility of war and unrest between China and Taiwan with US proxies, the possibility of a food crisis is always open, and we must prepare for it. At the same time, with the unemployment situation and lack of budget/cash in the KR, we are further adding to the reasons as to why we must pay serious attention to our agriculture, which will save us from many current and future problems.

The importance of this sector will increase over time, not only because of its contribution to the country's GDP but also because of the increase in the population and their needs with the relative increase in living level. This change will contribute to the economic development process in the region.

As is obvious, the region is going through economic instability and a challenge to the productivity process. We can summarize them in the following points:

- Increasing the gap between the production process and consumption of agricultural products.
- Lack of participation of the AS in providing food and raw materials to the industrial sector.
- Weak participation of the AS in the high individual and national income.
- Large outflows of heavy currencies, especially the USD, to import food products.
- Lack of attention to agricultural products, both plant and animal.

These points have led to market dumping of products from neighboring countries and has directly affected the production process as well as individual and national income of the population of the region. Therefore, full attention should be paid to this vibrant sector, which will lead to the development of other sectors of the economy with the increase in the level of income of the Kurdish individual. Therefore, it is up to the KRG to work on the development of this sector by increasing production in quantity and variety through investment in larger agricultural areas and working to make agriculture more sustainable and complementary in the region. This will help to achieve a good balance between environmental, social and economic principles for generations, with the provision of requirements for agricultural processes such as (chemical fertilizers, pesticides, advanced agricultural equipment and materials, implementation of advanced agricultural methods, protection of the private sector materially and spiritually, providing agricultural services, etc.).

It is worth mentioning that there are some specific agricultural characteristics in the region, whereby agricultural land is divided into guaranteed rainfall and non-guaranteed rainfall areas, and based on the total rainfall weather this shows that most of the favorable agricultural land in the region are 60% unguaranteed rainfall. There is no doubt that winter crops (demi) depend on rainfall, and fluctuations in rainfall have a direct impact on the amount and type of production.

2. Principles of food security:

Food security can be defined as (guaranteeing the provision of healthy food in adequate quantities and types for all citizens on a continuous basis at all times, especially in times of emergency and crisis). According to World Bank international food summit conducted in 1996 the principles of food security are: (https://www.albankaldawli.org/ar/topic/agriculture/brief/food-security-update/what-is-food-security)

A. Food availability: Means the availability of enough food to meet the needs of citizens. This principle determines the availability of adequate food in markets and households with domestic, imported, and stored products, and the adequate amount of food must be available in any way for the stability of families and society.
B. Access to food: This principle explains whether the availability of adequate food in the country means that all individuals and all families have access to the necessary amount of food. For this reason, access to food is considered a key pillar of food security, which includes income, expenditure and purchasing power of households and individuals.
C. Food Consumption: Taking advantage of an individual's ability to consume equivalent, healthy, and nutritious food systems to suit their needs and assimilate well. Therefore, food consumption is another basis of food security. The amount of food consumed by citizens does not only address it, but also plays a role in what food they eat. And how do they eat it? It also describes the ways in which citizens consume food, how food is consumed and distributed among family

members, water and sanitation use, exercise, and health care. Are the foods that individuals eat healthy and appropriate? Are they prepared in a healthy way? Is the diet taken into account?

D. Stability: This principle must be coordinated and in line with other principles at all times. A citizen cannot be said to have stable food security if he does not feel stable in the factors that lead to stability.

Second: Obstacles and problems facing sustainable development of ASWR:

1. Challenges to sustainable agricultural development:

When formulating and reviewing sustainable agricultural economic strategies, consideration must be given to achieving best practices and predicting the obstacles to future agricultural development, while taking into account the goals of sustainable development, which leads to the discussion of the following topics (Arab State University, 2019, pp. 34-35.)

A. Food Security:

The amount of food available for consumption in the KR has increased very slightly in recent years, with wheat taking the lion's share. Despite the additional increase in the use of food, but not in good types, there is still lack of food and sometimes in a relatively affected political and economic crisis because the smallest issue of security and external political pressure is has an impact on food security. Trade has filled in for these food shortages.

B. Climate Change:

Given the current drought conditions, water scarcity, and reliance on dryland cultivation and the use of old systems of agricultural and food production in the KR, climate change is expected to have long-term impacts on key economic sectors and food security. Continued drought has affected hunger, food insecurity and has lead to the loss of a dignified lifestyle in several areas.

C. Human and Institutional Capacity Development:

The KR faces severe capacity shortages in many areas, especially in technology and geographical information such as forecasting, early warning systems, production incentive policies, and international agricultural trade policies. It is worth mentioning that the lack of parallel between the higher education system and needs of current university students/graduates has harmed the market in such a way that old university subjects do not lead to innovation and new techniques. Business leadership also does not include the necessary businesses to encourage university graduates to think about starting their own businesses and not relying solely on the government and the public sector. Despite the weakness of coordination between agricultural research centers, there is a lack of exchange of expertise and producer training programs, especially field training, business orientation building and low resistance adaptation financial funds for training. Above all, the migration of scientific, administrative, and managerial intellectuals abroad, which is attracted from abroad.

D. Weaknesses in relying on techniques:

Agricultural research, extension and technology transfer institutions are the cornerstone of the KR's potential if they are supported and funded. It is noteworthy that the researchers of the KR have made significant efforts to develop new techniques and many new crops in the National Committee for Registration, Certification and Protection of Agricultural Varieties of the Federal Republic of Iraq registered in Baghdad. However, at the same time, the KR faces great resistance in adopting the necessary solutions to develop agricultural research, for example: Weaknesses and Insufficient use of agricultural and technical research staff available in most agricultural research institutions, lack of encouragement of private sector participation in agricultural research, lack of training and weak coordination between universities and agricultural science research centers, weak funding, and encouragement researcher’s.

E. Lack of appropriate policies and strategies:

Agriculture in the KR suffers from weakness and a lack of guidelines, systems, policies, and laws necessary to manage sustainable agricultural development For example, the construction of an agricultural policy using a comprehensive approach that covers all sectors linked to the general economic policy and the integration of production and marketing is flawed, in addition, many programs and policies are disabled due to party conflicts and changes in party policy.

2. Related Key Issues:

The main issues related to the obstacles and problems facing the (sustainable development) of the ASWR are included in the following articles (University of Arab States,2019, pp.32-33.)

A. Food loss and waste:

The challenges of food loss and waste have long-term implications for food security, the environment, and the economy. The KR suffers from increased food waste, sometimes reaching 210 kilograms per person per year. This makes us put more emphasis on this issue and highlighting the need to do more research on food waste and emphasize the organization of social, technological, behavioral, cultural, environmental, and economic directions, causes and motives.

B. Trade Supplement (Technical Trade Barriers, Health Procedures and Plant Health Procedures):

As part of Iraq, the KR must be committed to taking trade facilitation measures as required by the World Trade Organization system to strengthen trade and marketing. Of course, technical trade barriers and health and phytosanitary measures must be avoided, but the relevant government authorities must take full technical and health measures to protect food safety.

C. Social justice and empowerment of women and youth in neglected rural communities:

The issue of gender equality and the participation of women and youth in the process of sustainable agricultural development is great interest to the KR along with their participation in politics. The main requirements for protecting women's justice are in the distribution of resources, education, financing, technology, and job opportunities, which fortunately are of special interest to the KRG.

D. Adaptation and resilience:

Building capacity to adapt to climate change is an important issue in Iraq in general, especially in rainfed areas where agriculture is declining dramatically due to drought. It must take immediate and appropriate measures to help strengthen climate change adaptation and resilience, especially by developing comprehensive policies to empower youth and build their capacities. It certainly needs international support and cooperation, along with participation in the Paris Agreement on Climate Change Adaptation.

E. Environmental issues (biological diversity, climate change):

The harsh environment has had a negative impact on the AS in the KR, such as declining production and productivity, lack of jobs, lack of food and sometimes hunger and food shortages. These conditions are exacerbated by climate change, which puts great pressure on biodiversity, leading to the loss of many species of plants, animals, and aquatic animals, which must take appropriate and effective measures to combat and reduce the impact of climate change and help with the protection of plants and animals. It is important to mention the coordination between stakeholders and community groups to establish rural nurseries to restore native plant cover through reforestation and restoration of nature, and the establishment and stabilization of sand dunes (sand dune stabilization). These include the establishment of agricultural research centers, nursery banks, seed banks and biodiversity conservation.

Preliminary assessment of the level of drought- Low rainfall in the KR

Administrative Unit	Total number of villages	Number of villages whose water resources are guaranteed to dry up	Percentage of total administrative units	Number of villages threatened with drying up of water resources	Percentage of total administrative units
Erbil	1013	330	%33	324	%32

Sulaimani and Halabja	1275	352	%28	186	%15
Duhok	939	171	%18	364	%39
Garmian	394	0	%0	12	%3
Koya	149	14	%9	83	%56
Total	3770	867	%23	969	%26

Source: Ministry of, B.G. Water Resources, Preliminary Assessment of the Impact of Low rainfall-Drought in the KR, April 2022.

Note:

A. The report combines the number of villages threatened with drying up of water resources with those not threatened and separated here.
B. The report mentions 3,770 villages, but only 2,621 villages are mentioned in the report.

C. (Nexus) between water, energy, and food:

Although there is a strong relation and high and developed dependence between water, energy and food in the KR, but ill treatment of these sectors has led to an imbalance between their different uses. It will be even more due to high population growth, and the risks of consumption choices. Therefore, to ensure the sustainability and stability of the water, energy and food sectors, a coordinated policy must be pursued to achieve a balance between them. This increases the scope for innovation and learning to address security threats, strengthen existing utilization capabilities, and manage demand and balanced and sustainable utilization patterns.

3. Technical issues related to agriculture and water resources:

We see that whenever agriculture has the ability to expand and develop the economy, farmers and livestock breeders will be committed to their land and their profession because it is profitable. Most of the agricultural studies and research show that Kurdistan's land is suitable for agriculture with its fertile soil and climate. This is in addition to the presence of strong natural and human factors that all encourage agricultural production and productive energy for this region, many of the various agricultural products have been exported to southern Iraq and some of them abroad.

However, this vibrant sector has recently experienced a major setback, due to the following main reasons:

1. Decreased agricultural land area and low productivity.
2. Increased investment in residential cities.
3. High employment of village residents and their unemployment.
4. Allowing the import of agricultural products while they are produced locally.
5. Open unemployment, now estimated at more than 20%.
6. Hidden unemployment is now estimated at more than 60% in all government agencies.
7. Unemployment in the use of agricultural tools is estimated at more than 30%.
8. Agricultural backwardness is due to administrative backwardness and high costs of production and marketing, while the countries around the region either have good experience or support and compensate agricultural investors in these countries to compete in the markets of the region and drown our domestic production.
9. On top of all the above, water resources in the region are weak, especially in terms of infrastructure (collection and distribution), so many agricultural lands are dependent on rainwater.
10. In general, agricultural production in the region has disappeared in the last (3-4) years due to the financial crisis.
11. Domestic and External Environments We emphasize only two structural relationships: the elites of production and its sectors on the one hand and economic organizations on the other.
12. The impact of agricultural strategy, policy and economic, political, social, and cultural planning has been very weak.

Third: The objective of developing the ASWR:

Agriculture is an opportunity for the KR, and the development of this sector will be parallel to the various needs for investment and employment. In order to develop this sector, in addition to investment projects in agriculture, the KRG should work together in the following areas:

1. Initiate data reforms such as agricultural surveys, price collection and valuation, soil surveys and analysis, soil and water maps and land records.
2. Review all subsidies, taxes, import bans and license fees.
3. Develop and establish effective mechanisms for research and extension in coordination with ministries. Include agricultural research centers and colleges. In addition, a major agricultural revitalization program (as discussed below) can create local economic activity and jobs.
4. With regard to water resources, several comprehensive interventions are proposed that target poverty and focus on water resource development and management, as well as the provision of water services.

A. Objectives:

They will include:

First: Planning and managing food and water security and supply, strengthening local and national water use management mechanisms.
Second: improving food services and quality of agricultural products.
Third: Paying attention to the villages and improving their livelihoods, reducing unemployment, and creating job opportunities.
Fourth: balanced strategic growth.
Fifth: Changing the Kurdish individual from consumer to producer.
Sixth: Activating available sectors and directing agriculture to import exchange strategies.
Seventh: Reduce government support and stabilize the AS and reduce government spending.
Eighth: Modernization and industrialization of advanced agriculture.
Ninth: Achieving appropriate agricultural development and its impact on the national economy, contributing to food security, and making use of available human and natural resources, and increase agricultural production, including both plant and animal sectors, to GDP of not less than (15%) by 2027 and not less than (30%) by the end of 2028.

B. Strategic Vision:

Building a region that is developed, advanced and sustainable in terms of agricultural economy.

C. Message:

Develop the future of agricultural projects based on industrialization and modernization of advanced and sustainable agriculture.

"Direction of agriculture for industrialization, modernization and export.

D. Strategic Goals: Goals

The proposed reform and strategic plan for sustainable development of the ASWR 2025-2029 includes seven main programs and 14 sub-programs in different branches of the sector as follows:

1. Technical transfer and increase and sustainability of production, productivity, and agricultural achievements.
2. Governance of the administrative system and the use of the existing resources of the KR and its continuity.
3. Strengthening competitiveness and improving the investment and agricultural trade environment.
4. Plant and animal health and food safety.
5. Rural revival and development, innovation, and leadership to promote women and youth.
6. Building human and institutional capacities and providing agricultural science.
7. By industrializing the AS.

To enter the next steps in a comprehensive and reliable framework (policies, tactics, and treatment mechanisms), the agricultural strategy must be followed in the following stages:

First Stage: Emergency Planning and Problem Solving **"Balanced Strategic Development"**

Second Stage: Activation of available sectors through the agricultural development program **"Agriculture Orientation for Import Exchange Strategy"**

Third Stage: Future development of agricultural projects based on industrialization and modernization of advanced and sustainable agriculture **"directing agriculture to industrialization, modernization and export".**

E. Planning Period:

Five years from 2025 to 2029 inclusive

Fourth: Policies and mechanisms to address the obstacles facing the ASWR:

In order to achieve a healthy goal and have a complete plan and strategy for the AS, according to SWOT analysis, we must first identify the obstacles and problems facing the AS and strengthen the strengths and then the solutions to the obstacles and problems will be identified, which vary according to the type of production (plant and animal) as mentioned below:

Weaknesses Points:

1. Lack of expertise of employees and farmers and lack of highly qualified research centers.
2. Lack of new and advanced technology in the field.
3. Lack of laws related to water use, protection, and management in the KR.
4. Lack of budget or non-approval of budget for several important agricultural projects.

Strengths Points:

1. Large area of fertile agricultural land for cultivation.
2. Suitable climate for planting in most parts of the KR.
3. Abundant and adequate water sources.
4. Young population and a large number of technical employees in the ministries and institutions, which has one employee for every (50) farmers.
5. A place located at the heart of commercial roads and commercial square.
6. Stable security and a government committed to reform.
7. A supportive community that is ready and eager to help.

Threat Points:

1. Comprehensive encroachment on agricultural land, forests, and pastures without regard to applicable laws.
2. Expansion of municipal boundaries at the expense of the best agricultural land for cultivation.
3. Neighboring countries continue to build dams and irrigation projects on the rivers flowing into the KR.
4. Excessive use of groundwater for all purposes by citizens and government offices and not using alternatives.
5. Infiltration of bad and cheap products from abroad into the KR through official channels and smuggling.
6. Smuggling of live animals and poultry at the borders.
7. Spread of animal and plant diseases.
8. Natural disasters such as lightning, floods, and droughts.
9. Construction of houses and villas on agricultural land.
10. Global climate change and its impact on KR climate.

Opportunities Points:

1. Interest in investment of AS.
2. Having a good market in the KR and Iraq for marketing agricultural products.
3. Supporting the program of by the Economic Council, Universities and the Agriculture and Irrigation Committee of the Kurdistan Parliament.
4. KR's natural topography helps to build several dams and irrigation projects to irrigate agricultural land.
5. Good climate and soil for planting.
6. Increasing the standard of living of the citizens of the KR.
7. Availability of new technologies in the field of agriculture.

To achieve the objectives of the above strategic plan, we can discuss all the problems and obstacles facing the AS and their proposed policies, tactics and solution mechanisms in teamwork and coordination with the relevant parties:

1.Water resources and weather bureaus:

Problems and barriers	Proposed policies, tactics, and treatment mechanisms
1. Insufficient economic use of water resources	○ Economic use of water resources, establishment of dams and ponds and irrigation projects on rivers. ○ Establishment of dams to prevent the acceleration of rivers and muddy waters, which causes the beauty of nature, increased groundwater, and increased bursting of springs. ○ Establishment of new irrigation systems such as drip irrigation and axial irrigation networks in wheat cultivation. ○ Attempts to delay the receipt of wheat from the wheat receipt plan according to wheat maturity. ○ Encourage the cultivation of drought and water scarcity resistant wheat varieties for Coarse or durum wheat (Al-Khshna in Arabic language) in rainfed areas and Soft wheat (Al-Naema in Arabic language) in rainfed areas. ○ Establishment and laying of agricultural canals. ○ Issuing guidelines for drilling groundwater wells in mountainous areas.
2. Weakness of the weather bureau, which makes it difficult to predict the weather and know its ups and downs and paths	○ Establishment of an advanced meteorological office. ○ Guidance of farmers by meteorological offices ○ Opening WhatsApp and Viber groups for all farmers and informing them of weather forecasts and routes
3. Differences in rainfall in agricultural lands and fluctuations in production	○ Gradual conversion of arable land to irrigated land in order to achieve complete irrigation. ○ Regulation and licensing of wells for demi land.
4. Preventing citizens from flooding their lands	○ Compensation to farmers whose lands (all types of property, contract, mountainous, registered, etc.) are flooded as a result of the construction of dams. ○ Compensation of farmers affected by natural disasters and insurance. ○ Insurance activation.
5. Establishment of unlicensed factories directly on the river courses, polluting river water and causing damage to agriculture	○ Suspension, closure, and prohibition of licensed and unlicensed factories directly on the river courses. ○ Issuing instructions to keep the factories two kilometers away from the river courses.
6. Incomplete management of river and waterways.	○ The management of rivers and waterways, which is in the hands of several ministries, should be returned to the Ministry of. ○ All three levels (owner, decision maker, manager, and consumer) of water should be identified. ○ No investment project without the approval of the Ministry/ b. General water resources should not be given. ○ Through investment, groundwater should be redistributed through several rivers and artificial canals in the KR and instead of the full cost of projects on this river for a certain period of time to the same investment company.
7. Waste of river water	○ Establishment of levees and rapid reduction of rivers. For example, from (Haj Omeran to Kalak, water should be blocked every 5 km to Khabat (Kalak) only with sand, stones, and sand dams, at the lowest cost through road projects and investment in dumping their sand and garbage. ○ Invest in fast water pressure in the highlands of the region, or by establishing water networks, or by establishing open or hidden schedules and channels to irrigate good agricultural land such as the canals of the Shamamk and Aski Kalak irrigation projects. ○ Control and rehabilitation of canals of Sangasar and Delen/Sulaimani irrigation projects.
8. Lack of dams in the upper geography of the region and	○ Efforts to build dams on both the Great and Khabur rivers. ○ Repair of mountain lakes.

water wastage and lack of dams on both the Great and Khabur rivers, not stopping the water of mountain lakes	○ Efforts to revive and preserve mountain lakes
9. Lack of underground water recharge systems in valleys and rivers, non-saturation of groundwater and waste of water in valleys and rivers	○ Construction of underground water recharge wells in valleys and river areas according to the geology of the areas in the cheapest way through cheap machines portable 20-100m. It will save us from floods and will be useful for cheaper oil extraction, increased mudslides and explosions of springs and will protect us from the risk of explosions of dams. ○ Obliging residential projects to undertake the construction of underground water recharge wells in valleys and riverbeds.
10. Large budgets for dams	○ Pond construction has the same economic characteristics as dams and has several different characteristics, including: 1. It will be implemented much faster than the dam. 2. Many farmers in different villages and cities benefit from it. 3. They are easier to maintain and less dangerous. 4. They will be implemented at a low cost of about 300-400 million dinars per million cubic meters. ○ Eight ponds have been approved in Duhok and are budgeted to be implemented quickly.
11. Use of well water in water production plants, car washes, carpets, and carpets.	○ Ban all factories that use well water for water production. ○ Suspension and non-renewal of any permit that does not have a clean surface water source. ○ Comply with car washes, carpets, and carpets with re-treated water. ○
12. Lack of protection of Iraqi water from international water	○ Efforts to protect the Iraqi water share (international water share protection) from international waters, including the KR from international rivers, which is the responsibility of the Federal Republic of Iraq. ○ Coordinate with consulates and embassies for this purpose. ○ Efforts to restructure the 1975 water treaty with Iran
13. Use of wastewater for fruits and vegetables	○ Prohibition of using wastewater for fruits and vegetables without filtration ○ Activate health care committees. ○ Attempts to re-treat the wastewater by installing several basins and filtration equipment
14. Grazing from December to March around dams and ponds causes the destruction of plants that the animals eat from the roots and disappears for next year, causing drought, water shortages and flooding of dams and ponds	○ Prohibition of grazing from December to March around dams and ponds

2. Environmental protection

Problems and barriers	Proposed policies, tactics, and treatment mechanisms
1. They were the first to join the Paris Agreement on Environmental Protection	• Continue the Paris Agreement on Iraq's specific national contributions to climate change 2021-2030. Nationally Determined Contributions of Iraq (NDC) • Attention to and implementation of NDC recommendations
2. Lack of financial support for environmental projects	• Using the Korean Support Fund for GCF Environmental Projects and preparing environmental protection projects and monitoring their implementation.

3. Lack of awareness and guidelines for wildlife management.	• Issuance of wildlife retention guidelines. • Spread awareness of wildlife conservation.
4. Some agricultural processes harm the region's environment.	• Not using any products that are harmful to the environment. • Implementation of Law No. 8 on Environmental Protection and Rehabilitation / Article 28 that agricultural processes must not harm the environment of the region.
5. Ineffectiveness of water management and protection laws	• Raising and resolving strategic and major water issues in the Water Council established in the KR in accordance with Law No. 4 of 2022/Article 7
6. Changes in rainfall	• Implementation of artificial rainfall projects
7. Lack of social compensation for private sector projects	• Company Social Responsibility Private sector projects by implementing environmental protection projects such as artificial forests, parks, etc. according to government strategy.
8. Not investing in groundwater	• Sustainable investment in groundwater and its conservation for future generations, water harvesting, reducing water wastage, innovating new techniques in monitoring groundwater resources, identifying its type. • Maintaining the hydrogen balance of groundwater in general. • Attention to and implementation of NDC recommendations
9. Reducing the water level of the Tigris, Euphrates, Sirwan and Dukan Lakes and their tributaries by the partner countries	• Work with partner countries in the waters of the Tigris and Euphrates rivers and their tributaries (Turkey and Iran) to respect Iraq's rights in its shared waters and strengthen regional cooperation with it to achieve water and climate security. • Attention to and implementation of NDC recommendations
10. Degradation of soils, pastures, and vegetation cover	• Stop soil, pasture, and vegetation cover degradation. • Efforts to rehabilitate pastures and vegetation cover and improve land management practices. • Relying on smart and conservative agriculture, especially in agriculture and forestry.
11. Inability to cope with climate change	• Update, improve and develop agricultural practices and livestock development in a way that meets the principles of adaptation to climate change.
12. Lack of natural protections	• Increase natural preservatives. • Consider the diversity of these protected areas to ensure the protection of as many endangered species as possible. • Enforce the laws and regulations that provide this protection. • Deforestation, increase in area and sustainable management. • Use mountaineering and environmentally friendly groups to plant trees.
13. Occurrence of drought, floods, storms, and dust	• Build and develop monitoring and early warning systems and build capacity to monitor extreme weather events such as droughts, floods, storms, and dust storms to take necessary precautions to reduce human and economic damage. • Provide financial and technical support for the development of computer techniques and remote sensing. • Analyze and forecast climate fluctuations according to IPCC scenarios as part of early adaptation to mitigate the large amount of damage caused. • Establishment of future Kurdistan climate models and scenarios.
14. Weak national and regional partnerships to	• Strengthen national and regional partnerships to manage climate crises and disasters and limit associated risks.

manage climate crises and disasters	• Strengthen ecological systems to resist extreme events (floods and drought waves) to prevent the risks of climate change-related natural disasters.
15. Lack of tree planting around power plants	• Use of Nature Base Solution by planting trees around power plants
16. Waste of water from households, agriculture, and soil removal	• Efforts to provide water reuse projects for use in irrigation of gardens and urban greenery through the private sector. • Control the cultivation of crops that emit large amounts of methanol, such as rice, which waste a lot of water and remove soil.
17. Lack of use of alternative energy such as solar and wind.	• Develop and encourage farmers to use alternative energy such as solar and wind energy to operate irrigation trumpets and wells, and the use of efficient irrigation systems.
18. Fires in natural forests and lack of protection systems	• Implementation of complementary management to fight fires in natural forests. • Reclamation of burnt and degraded forests. • Establish a system of protection and rehabilitation of natural and artificial forests and increase their areas. • Recognize the importance of establishing green belts to reduce CO2 emissions.
19. Lack of environmental awareness about climate-smart farming.	• Focus on environmental awareness about climate-smart farming. • Improve the technique of using nitrogen foam to limit N2O emissions
20. Weak procedures and sometimes lack of agricultural quarantine at borders and airports, which has led to the introduction of unhealthy and bad types of pesticides, etc., which have had a negative impact on production.	• Pay attention to the establishment of agricultural quarantine centers at the borders and airports that have all the testing requirements for agricultural products, seeds, and nurseries. • Stop allowing the import of all products (temporary or permanent) that are not good in the region and coordinate with and. Federal Agriculture of Iraq. • Develop and reorganize the Measurement and Quality Control Board. • Encourage and facilitate the privatization of quality control. • Enactment of the Quality Control Act. • Strengthening the Food and Drug Protection Agency: If urgent steps are not taken by the federal government in this area, the KRG must rely on its constitutional law to adopt and implement a separate and independent form of standards so that it can continuously inspect domestic products and agricultural and medical imports to ensure quality, competence, and safety.
21. With a strategy of not knowing water.	• Strengthening and enforcing the Water Management and Conservation Law No. 4 of 2022 to better manage and reform water use and conservation. • Develop long-term strategic plans in all water sectors. • Maintaining water balance between extracted and used water for all sectors. • Activating the establishment of the Water Council in the KR according to the Water Management and Protection Law No. 4 of 2022 for important water issues such as: Water conservation and quality, water strategy and use policy, construction of large dams and high irrigation projects, water laws and attempts to establish dam projects through the BOT system.

3. Rules and Regulations

Problems and barriers	Proposed policies, tactics, and treatment mechanisms
1. Lack of amendments to the law	• Law on the regulation of hunting. • Law on the use of natural resources and resources. • Law on Extinction and Separation of Land within Municipal Boundaries No. 3 of 1998 (as amended). This law has led to the waste of agricultural land in the KR and continuing this law will be the loss of the best agricultural land. • A law on tourists, climbers, and scientific tourism. • Amendment of the law for the protection of natural resources and wild animals and birds (Iraqi Law No. 2 of 1983 on Wild Animals and Birds). • Dam Protection and Safety Law. • Amendment of the Coastal Protection Law (No. 59 of 1987 of Iraq). • Amendment of the Law on Protection of Wild Animals and Birds No. 21 of 1979/Iraq.
2. Lack of guidelines for the development of according to changes	• Issue current guidelines that are compatible with today's economic developments. • Guidelines for the establishment of foam and chemical pesticide factory projects. • Wildlife Keeping Guidelines. • Suspension of the application of Directive No. 8 of 2013 on issuing licenses to build fasting.
3. Lack of effective guidelines and laws	• Law on Protection and Development of Agricultural Products in the KR No. 4 of 2008. • Guidelines for the transaction, trade and production of drugs, vaccines, and veterinary supplies in the KR No. 5 of 2011 on the establishment of drug and vaccine factory projects. • Hunting Regulation Guidelines No. 1 of 2021. • Forest Protection Law No. 10 of 2021. • Guidelines for Well Drilling (No. 1 of 2015). • Law on Protection and Development of Agricultural Products of the KR No. 14 of 2008. • Law on Registration, Reliance, and Protection of Agricultural Categories No. 15 of 2013. • Natural Resources Law No. 2 of 1982/Iraq. • Forest Law in the KR No. 10 of 2012. • Law No. 48 of 1976 on the Regulation and Restoration of Aquatic Organisms and Their Protection.

Fifth: General Conclusions and Recommendations:

As a result of detailed research, we have reached the following conclusions:

1. Establishment of strategic irrigation projects with the use of new irrigation techniques.
2. Provision of some agricultural equipment and supplies that can be prepared based on local expertise and materials and industrial needs and local modernization. This can be done by establishing mechanisms to prevent the import of similar goods.
3. Price support policy for production inputs such as agricultural equipment, good seeds, pesticides, chemical fertilizers, etc. This should be based on the years of strategic planning and rely on the private sector to improve implementation, reduce costs by using new methods and modern technology and employing trained workers.
4. Comprehensive review of the role of the government in economic life in general and the AS in particular, by stopping the policy of unproductive investment, excessive wages and salaries and activating the incentive system. Additionally, removing the role of oil from economic life, and getting rid of the subsistence economy by diversifying the economy.

5. The KRG should only invest in agricultural infrastructure that the private sector cannot afford and involve the private sector in the proceeds of investment projects that have immediate economic benefits, especially direct or indirect foreign investment.
6. Pay attention to universities and scientific institutes and spend more on them in matters related to modern technology and encourage scientific research to implement through the renewal of the education system and adaptation to market needs.
7. Opening professional courses and training through foreign universities, colleges, and organizations.
8. Water strategy and establishment of ponds and dams.
9. Working on Underground Water Recharge Project.
10. Supporting excellent and self-sufficient products in the KR.
11. Considering environmental problems and coping with environmental changes and their solutions and proposing appropriate policies and mechanisms for their solutions. This ensures the success of strategic planning objectives.

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"الإصلاح البيئي والتخطيط الإستراتيجي للتنمية المستدامة للزراعة"

إعداد الباحث:

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الملخص:

تطورت العلاقة التاريخية للتقدم بين التنمية الزراعية وعمليات تحسين الإنتاج إلى عدة استراتيجيات. والأهم من ذلك، أنها تضيف إلى تنويع النشاط الزراعي والإنتاج الزراعي المعروف بالقيمة المضافة الزراعية. والزراعة فرصة لإقليم كردستان، وتنمية هذا القطاع سوف تتوازى مع الاحتياجات المختلفة للاستثمار والتشغيل. ومن أجل تفعيل هذا القطاع، ومن أجل تحقيق هدف صحي والحصول على خطة واستراتيجية كاملة للقطاع الزراعي .(AS) وفقًا لـSWOT ، يجب علينا أولاً تحديد العقبات والمشاكل التي تواجهAS ، وتعزيز نقاط القوة، ثم تحديد الحلول للعقبات والمشاكل التي كان للتغيرات البيئية تأثير مباشر على التنمية المستدامة في القطاع الزراعي وموارد المياه .(ASWR)تتضمن الخطة الإصلاحية والإستراتيجية المقترحة 2025–2029 البرامج الرئيسية والفرعية في مختلف قطاعات القطاع، وللدخول في الخطوات التالية يجب أن يتم اتباعها في إطار شامل من السياسات والتكتيكات والآليات الموثوقة للتعامل مع التغيرات البيئية والموارد المائية.

الكلمات المفتاحية: النمو الاقتصادي، الإصلاح، التخطيط الإستراتيجي، التنمية المستدامة، السياسة، التغير البيئي.