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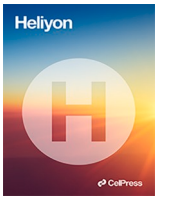

Research article

Development and environmental policies of Ethiopia: Policy review from view point of development-environment sustainability linkage

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ABSTRACT

Ethiopia is rich in a wide range of agro-ecological zones in which a variety of agricultural activities and farming systems operate. These agricultural activities and farming systems affect the quality of the environment and sustainability of natural resources in different ways, which should be one of the prime concerns of national development policies. The objective of this study was to determine the extent to which Ethiopia's national development, environmental policies, and strategic plans consider the interrelationship between farming systems and environmental sustainability. The second objective was to determine the extent to which the policies and strategies integrate economic growth and environmental sustainability. Accordingly, different national development policies, strategies, and programs of Ethiopia were reviewed. The results reveal that these policies and strategies fundamentally focus on economic growth. Policymakers did not pay adequate attention to the environmental effects of farming systems in national development policies and strategic plans. Policies do not consider the integration of development and environmental sustainability. Simply put, the multidimensional links between economic growth and environmental sustainability have not been adequately articulated in development policies and programs. Therefore, both economic and environmental effects of the farming systems should be well-addressed during the preparation of development policies and strategic plans.

1. Introduction

Agricultural activities are typically dependent on the exploitation of natural resources, such as soils, water, natural vegetation, and animals. Because these natural resources form the foundation of the physical environment, the quality of the environment is ultimately determined by the standard and level at which the resources are managed [1]. As a result, the way farming processes are operated and managed determines environmental sustainability on a local to global scale.

Considering the intricacy between farming practices and environmental sustainability, it is essential to formulate and implement policies to smooth the relationship between the two variables. In terms of intent, environmental policy is typically formulated with the goal of governing human-physical environment relationships to the greatest extent possible, so that both humans and the environment benefit [2]. Environmental policies focus on problems caused by human activities that negatively affect human health or opportunities

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for human beings to live in clean and green environments [[3] p.4].

Ethiopia is rich in a wide range of agro-ecological zones where a variety of farming systems are supported. Agriculture, operated under varied farming systems in the country, is the leading economic sector in terms of its share of GDP, exports, and employment opportunities, accounting for approximately 35.5% of the GDP [4], 72.2% of employment opportunities [5], and 90% of exports [6]. Approximately 95% of agricultural GDP and 85% of employment in the country are generated by smallholder households [6]. Small-scale farming systems are dominant in both production share (containing more than 95% of main crops [7]) and labor engagement. Unplanned land use, coupled with acute land shortages, mainly in the highlands of Ethiopia, contributes significantly to environmental degradation, such as soil loss, nutrient depletion, deforestation, and water pollution. Farming systems would therefore have decisive effects on the quality of the environment and the sustainability of natural resources, which should be one of the concerns of national development and environmental policies and strategies. Generally, in addition to the economic perspective, development policies and strategies should carefully consider the environmental effects of farming systems. Similarly, environmental policies and strategies should not bypass the inseparable relationship between the environmental and economic impacts of economic activities, although emphasis should be placed on the former.

In this study, assessments were made to determine how well Ethiopia's development and environmental policies and strategies address the interrelationship between economic growth and environmental sustainability. The study also aimed to determine the extent to which policies and strategies addressed the environmental effects of farming systems in the country. In fact, some researchers have reviewed the major development policies of Ethiopia. For example [8], assessed the contribution of the first Growth and Transformation Plan (GTP I), emphasizing its economic contribution. A comparative economic analysis was also conducted on the three main development strategies and plans of Ethiopia: the Sustainable Development and Poverty Reduction Program (SDPRP), the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), and the GTP [9]. Another researcher who has undertaken a review of Ethiopian environmental policy is [10]. Furthermore [11], discussed the ways in which environmental, natural resource, and agricultural policies in Ethiopia are formulated. Another environmental policy review carried out by Ref. [12] focused on the appraisal of policies and practices with reference to international standards. However, these environmental policy analyses did not consider the extent to which the policies integrated environmental sustainability and economic growth. The environmental impacts of the different farming systems are also another important issue left untouched in all the above-mentioned research works; hence, this research addressed the issue of due concern. However, it is worth mentioning that the researchers understood that it would be much better if this research were broader in scope and included the policy development experiences of other countries. However, it was found that it would be more extended and difficult to manage if evaluations of the policies of other countries were incorporated. Consequently, some of Ethiopia's policies and programs had to be omitted to narrow down the scope. This makes the research less comprehensive in reviewing Ethiopia's major policies and programs. Additionally, this study employed a qualitative approach, and the significance level of the impact of policy implementation on the environment was not numerically expressed. Therefore, it is important to note that these should be considered as limitations of this research.

2. Research methods

This study used a descriptive research design. The information used in this research was gathered from Ethiopian development and environmental policy documents. Intensive document analyses were performed to collect the data. As the collected data were qualitative by nature, a qualitative data analysis technique was applied in the research.

The research process followed three major phases. In the first phase, the FDRE Constitution; the recently formulated (starting from 1997, when the recently formulated) national development policy instruments, strategic plans, and development programs, were identified and sequentially arranged. These include SDPRP, PASDEP, Growth and Transformation Plans (GTP I and II), Agricultural Development Policies, Environmental Policy of the Federal Democratic Republic of Ethiopia (FDRE) government, Ethiopia's Agricultural Sector Policy and Investment Framework (PIF) 2010–2020); and the current Ten-Year Development Plan (2021–2030). Skimming was then performed on all the documents. In the second phase, detailed and systematic reviews were conducted on each of the policy instruments, strategic plans, and programs identified. Finally, the data collected through the review process were analyzed and interpreted. This step-by-step, one-by-one, and detailed review of policy instruments, strategic plans, and programs can be taken as the strength of this research.

3. Results and discussions

3.1. The FDRE constitution

Ethiopia has made environmental management and the quest for living in a quality environment a major concern in its existing constitution. As a result, Article 44 (1) of the Federal Democratic Republic of Ethiopia [FDRE] Constitution of 1995 declares that '[a]ll persons have the right to a clean and healthy environment' [[13] p.16]. Article 92 (1) also states that " [g]overnment shall endeavor to ensure that all Ethiopians live in a clean and healthy environment" [13 p.16]. Any form of environmental damage that may arise from the design and implementation of programs and development projects is also prohibited by Article 92 (2). Article 3 of the Constitution also makes both the government and citizens responsible for protecting the environment. Besides the constitution, the FDRE Environmental Policy asserts, as a first key guiding principle that "[e]very person has the right to live in a healthy environment" [14 p.4].

Since the Constitution is the supreme law of all laws in the country, these articles must be taken as guides when economic, social, and political decisions are passed, policies are formulated, and practices are undertaken in any part of the country. This is stipulated in

the constitution Art. 9 (1); "[t]he Constitution is the supreme law of the land. Any law, customary practice or a decision of an organ of state or a public official which contravenes this Constitution shall be of no effect [13 p.4]". Nevertheless, the intent of the Constitution was not thoroughly entertained in development policies and programs. The same finding was reported by Refs. [14,15] that even though the FDRE constitution gives due emphasis to environmental protection, the country continues to face several environmental challenges, such as water resource contamination, deforestation, and wildlife emigration due to hampered implementation. This is also strengthened by Ref. [16], as his finding reveals that the implementation of the Constitution failed when it comes to environmental concern. It has also affirmed that despite significant achievements in the formulation and approval of environmental policy in Ethiopia, the implementation of the conservation strategy has been characterized by significant gaps [17].

3.2. The Sustainable Development and Poverty Reduction Program (SDPRP)

SDPRP2002/3–2004/5was designed with poverty reduction as a "core objective" and economic growth as a basic mechanism to meet this objective [18]. Based on this objective, specific objectives were set that focused on rapid economic development, making the country free from dependence on food aid, and making poor people benefit from economic growth. The three-year plan developed within the SDPRP was generally centered on agricultural and infrastructural development and assurance of good governance to achieve the objectives of poverty reduction with rapid economic growth.

When preparing such a plan, socioeconomic, environmental, and political attributes should be considered equally taken into account. In a scenario where agriculture is the most important emphasis, natural resources and environmental management are the most essential issues. Natural resource bases should be clearly identified, their current status should be defined, and the level of environmental management should also be clearly described. Furthermore, existing environmental problems should be identified and prioritized. The causes of these problems are other issues that require critical attention. Consequently, strategic plans need to be framed based on the types and causes of problems and their nature, priority given, and measures proposed in the plans. However, the SDPRP lacks the first three points.

In fact, in the national plan, it may not be manageable to incorporate the details of all of these issues. However, a general framework should be drawn within the strategic pillars and/or strategies focusing on the interaction between environmental sustainability and the economy, particularly agriculture. The plan should also incorporate the current status of the environment and natural resource bases, the management level, challenges of the environment and natural resource management, and the three-year priorities of environment and natural resource management.

In this regard, under the crosscutting issues sub-topic, there have been attempts to outline environment-development interaction. In this section, the establishment of the Environment Policy of Ethiopia, the objectives of the policy and its components, and environment-concerned institutions are described along with their tasks. For example, the Environmental Protection Authority (EPA) was mentioned as an "autonomous government agency responsible for harmonizing environmental protection and economic activities" to make economic and environmental improvements sustainable [19].

Land and water resource degradation was highlighted in the plan as a major environmental challenge. The aggravating factors of these problems are soil erosion, fertility loss, deforestation, and loss of biodiversity. Water pollution was also confirmed occurred "in urban and suburban areas," and plastic bag disposal was rated as a major environmental problem in urban areas in the country.

The level (degree of severity, spatial variations, and areal extent of the problems and the underlying causes of the problems, particularly land degradation and its aggravating factors (such as soil erosion, soil fertility loss, deforestation, and biodiversity loss), and water pollution) were not clearly explained in the plan. This principally has a detrimental impact on farming practices. It seems that the environment-related part of the program was almost entirely left to the EPA, which was not directly responsible for MOFED. In such a case, it would be crucial to prepare an integrated program that can be implemented by MOFED itself rather than leaving all the environment-related issues of the program (which have vital implications for economic development) to an independent authority-EPA.

Ethiopia is known to have a wide range of agro-ecological zones that are favorable for producing a variety of farming systems and crop types. Each farming system requires a particular zone of agro-ecology to be efficient and effective. Similarly, different farming systems are likely to have diverse environmental impacts when they are misallocated and mismanaged. For example, fruit farming is a major farming system in the agricultural sector. It is practiced in many parts of Ethiopia, mainly in areas where irrigation is technically feasible. Fruit farming has multidimensional effects including economic, nutritional, and environmental impacts.

As a farming system, fruit farming requires specific agro-ecological zones and management systems to be productive and ecologically safe. Hence, to make farming systems sustainable and eco-friendly, agricultural policies and strategies must have clear directions and strategic priorities about these farming systems. For example, to make farming systems eco-friendly, special strategies could be set related to the inputs of the farms, appropriate location of the farms, and the way they are managed. However, there were no such concerns in the program.

3.3. Plan for Accelerated and Sustained Development to End Poverty (PASDEP)

PASDEP 2005/06–2009/10was developed based on the monitoring and evaluation of the SDPRP. PASDEP set poverty eradication as a major objective, and sustainable development was emphasized in the five-year plan [20]. The plan included eight pillar strategies that were thought to help achieve this objective. The pillar strategies described can generally be categorized as infrastructure development, human development, rural development, food security, and capacity building. Sustained agricultural growth was identified as a major area of core sectors that planned to achieve the goals of sustainable development and poverty eradication. To this

end, agro-ecological suitability was taken as a key strategy for producing commercial crops, and growth corridors were identified based on their agro-ecological zone suitability. This can be seen as a one-step forward compared to SDPRP.

The major agricultural products that were prioritized were also identified. Agricultural technologies, efficient utilization of land resources, farmers' training, soil laboratory facilities, infrastructural development, agricultural area expansion, and effective pest control are the main instruments of agricultural intensification to meet the goals of sustainable agricultural growth and poverty reduction listed in the plan.

In addition to economic development and from the perspective of environmental sustainability, it is natural to think that PASDEP should answer the question of ensuring environmental sustainability. In this regard, the subject of environmental management was not part of the plan's eight pillar strategies, even though the problem of environmental degradation remained serious in the country [21–23].

In fact, in a certain section of the plan, the status of the environmental problem in Ethiopia, the interaction between environmental problems and poverty, and the relationship between the environment and development were discussed. Beyond this, the five-year plan also contained goals and strategies for environmental management. Nevertheless, the environmental management plan section was prepared mainly focusing on industries, gender, technologies, development projects, and municipalities, where there is no clear stand about the contribution of farm activities in the environmental degradation processes. These would also need clear and measurable strategies that help reduce the environmental effects of different farming systems without limiting the roles they should play in economic development based on their specific characteristics. This is because sustainable development could not come true under the "business as usual" system, where economic growth and environmental sustainability are not well integrated.

As a country where agriculture is the backbone of the economy, one of the main contributing factors to environmental degradation in Ethiopia is agricultural practices performed against ecosystem sustainability. As discussed in the first and second paragraphs, the plan emphasizes rapid agricultural growth to eradicate poverty. To this end, agricultural intensification has been considered the core strategy of development. Therefore, various inputs and strategic systems had been planned for the agricultural sector. For example, in the agricultural sector, there was a plan to expand farmland. In line with this, in the PASDEP there was a plan to expand the total cultivated land from 12.28 million hectares in 2004/05 to 12.65 million hectares by the end of 2009/10. As a result, the production was planned to increase from 16.7 million tons in 2004/05 to 38.21 million tons in 2009/10. Intensive fertilizer application was part of the plan to improve productivity. Thus, 8 million quintals of chemical fertilizer and 12 thousand tons of compost were needed to apply in the farms. Purchasing approximately 350 tons of pest control chemicals was also part of the plan.

Another strategy was to improve the productivity of livestock. There was a plan to increase total meat, milk, egg, and fish production by significant percentage changes. For the enhancement of milk and meat products, there was a plan to improve animal feed by applying strategies such as forage production and supply, expansion of improved pasture, bush clearing, and water development. Genetic improvement is one of the main strategies used to enhance agricultural productivity. These strategies are appreciable from an economic growth perspective. However, its environmental consequences are challenging. While farmlands expand and bush lands are cleared, it is most of the time against natural vegetation, since there is no more land otherwise. This is one of the major driving forces of environmental degradation, which can consequently alter efforts to maintain agricultural growth and reduce poverty.

The fruit farming system is one of the major agricultural subsectors with significant economic and environmental impacts that require planners' attention. Thus, in the five-year program, about 841, 100 quintals of fruits were planned to be produced. Similarly, the number of smallholders involved in fruit and vegetable production was supposed to reach about 379,750 by the end of the plan period. Furthermore, by expanding new varieties and transfer of technologies, there was a plan to increase the productivity of matured fruit crops (8 years after planting) by 400% compared to the past (50 quintals/hectare). To effectively implement such plans, it is necessary to intensively apply either new or more technologies, expand cultivated land, or use all these strategies. In addition to their economic benefits and role in reducing poverty, if they are not well managed with clear and measurable actions, the environmental consequences of these alternatives would become disastrous. Unfortunately, no clear strategic measures have been specified to address these probabilities.

For example, most fruit farmlands in the rift valley are bounded by lakes. Arba Minch Zuria Wereda of the Gamo Zone is one of the best examples where Abaya and Chamo lakes bind most of the fruit farmlands. Therefore, intensive chemical fertilizer and pest control chemical applications would result in soil and water pollution in the area. Together with deforestation, chemicals are the main cause of water pollution in the area [24–26]. However, the five-year development plan could not address such problems with specific and measurable strategies related to questions such as where certain types of technologies (e.g., chemical fertilizers and pesticides) should be applied and where they should not be applied to reduce their environmental effects? How do we consider very sensitive environmental elements, such as wetlands and water bodies, in implementing the plan? How can farmland expansion and vegetation management be reconciled? How can environmental problems arise from the implementation of the plan? Etc.

In the plan, approximately 4.7 million hectares of degraded area were projected to be covered by forests. Thus, at the end of the planning period, the total forest area increased from 3.6% to 9% in the country. Nevertheless, it was not clear which land-use types needed to be converted into forest land. It should also be clear that the specific measurements of PASDEP are shown in its policy matrix (Volume II of PASDEP). However, they did not address these and other farming and farming-related environmental concerns.

3.4. The Growth and Transformation Plans (GTP I & II)

Using the PASDEP as a foundation, the first five-year Growth and Transformation Plan (GTP 2010/11–2014/15), i.e., GTP I, was launched [27]. The main aim of the plan was to transform the country's economy by achieving rapid and sustainable economic growth. The plan was prepared with four objectives: framing the demand for bringing about economic growth at a rapid rate (at least 11%);

infrastructural development, mainly education and health; and democracy, which were envisaged to achieve the millennium development goals (MDGs). Seven strategic pillars are identified and listed based on their objectives. The objectives and strategic pillars generally focus on fast economic growth, social and infrastructural development, good governance, and equity.

Like PASDEP, agriculture was taken to continue being "the major driver of economic growth" in the GTP [27 p.22]. To bring about rapid economic growth and development, the agricultural development plan focused on intensive production of high-value (commercial) crops. The program clearly stated the application of both small-scale and large-scale commercial farms through the intensive use of water and other natural resources in the country as a general strategic direction for agricultural development. The application of new technologies such as irrigation, consideration of different agro-ecological zones, increasing capacity and extensive use of labor, natural resource conservation, proper utilization of agricultural land, specialization and diversification linkages, and rural development integration were the most important strategic directions discussed in the first GTP. Soil fertility improvement technologies such as fertilizers (including chemical and organic fertilizers) have been identified as strategies that can help increase crop production. In this regard, a new strategy was introduced: changing the blanket fertilizer application to a system where fertilizers are added into the soils based on a soil fertility test, which is undertaken by identifying agro-ecological areas, suitability for crops, and soil types, which could help reduce the environmental effects of fertilizers and enhance crop productivity. Nevertheless, the country has not yet realized this. In addition, the plan tried to clarify the contribution of different farming systems, such as fruit production and vegetable production, spice crop production, stimulant crop production, and major food crop production, to the economic growth of the country in its policy matrix of the program (GTP I Volume II). From this perspective, there was a plan to increase fruit and vegetable production and land cover with other crop types.

Environmental sustainability, soil and water conservation, watershed management, and forest management were specified in the agricultural sector plan. However, it has not been clearly articulated how to run these natural resource management processes with agricultural land expansion and agricultural productivity without affecting one of the two development aspects.

Environmental and climate change issues were discussed in a different chapter (crosscutting sectors). However, all the strategic directions, objectives, and targets of the proposed plan of the sub-section dealt mainly with climate change, adaptation, and mitigation measures. The concerns of natural resource degradation and pollution, issues of agricultural–environment interaction, and environmental impacts of the specific farming systems were not firmly targeted. This is because environmental problems were not clearly identified and strategies were not prioritized based on their degree of severity. Hence, clearly observable defects appeared in the plan in relation to prioritizing the impacts of farming practices on the soils, water bodies, and even the vegetation with their degree of severity.

Furthermore, GTP II was developed by evaluating the achievement of GTP I (National Planning Commission [6]. The achievements were admired as "remarkable growth achievements", and phrased as "rapid, broad-based and inclusive economic growth that has led to a substantial decline in income poverty" [6 p1-6]. In the agricultural sector, the performance of the program for vegetable and fruit production was 23.7% and 4.3%, respectively. The fertilizer and improved seed supply were 72.2% and 42%, respectively. Achievement performance was also seen from the perspective of natural resource conservation and development, which mainly considers soil and water conservation, forestry, and land rehabilitation.

Compared with GTP I, GTP II places more emphasis on creating a climate change-resilient economy. It stresses environmental pollution and degradation, climate change, and natural resource management in its strategic directions, and the body of the plan as separate sections. Based on this, the strategic directions pointed to the linkage between sustainable agriculture assurance and the development of natural resources underlining the green economy development strategy plan. Land rehabilitation, watershed development, and biodiversity conservation were considered the main strategies to bring about the intended fast-tracked and sustained agricultural growth within the Climate Resilient Green Economy framework.

In GTP II, agriculture was determined to continue leading the country's economic growth and development pathways. Among the targets of the agricultural development plan, the other part that received significant attention was the concern of dramatically improving the amount of crop production by smallholder farmers, where the average rates of increment were estimated and predicted. In this respect, irrigation-based agriculture and high-value crops such as horticulture, fruits and vegetables, livestock, and fisheries have been identified. This strategic direction was taken as a special characteristic that makes GTP II different from GTP I, as noted in the policy document. By expanding the areal coverage of croplands and increasing inputs, such as fertilizers and improved seeds, crop productivity enhancement was taken as the core point of the plan.

In the environmental management section, the major objective was to ensure environmental safety in the course of rapid and sustainable economic growth" [6 p.211]. Mitigation of environmental pollution is associated with this objective. Forestry and wildlife conservation and development have received considerable attention in recent years. However, the cause of environmental pollution was associated with urban expansion, lifestyle changes, and industrial expansion, where the impacts of farming systems were ignored.

The environmental consequences of smallholder farms in particular, and crop farms in general, did not attract the planners' attention. For example, to enhance crop productivity, there was a plan to increase the application of fertilizers, particularly chemical fertilizers, and expand croplands. If an exceptional management approach could not be followed (particularly for horticulture and fruit farmlands that are largely bounded by water bodies and wetlands in many parts of the rift valley), these kinds of strategies would induce irreversible environmental consequences. However, specific strategic pillars have not been specifically set out to address these types of problems. Land rehabilitation, watershed development, and biodiversity conservation may be sufficient to arrest environmental problems (such as soil, water, and biodiversity pollution and degradation) that arise from both small-scale and large-scale farming systems. However, the controversy is that the causes of environmental degradation identified in the strategic plan are far from farming systems, and hence could not reflect the reality.

3.5. Ethiopia's Agricultural Sector Policy and Investment Framework (PIF)

PIF (2010–2020) is another policy instrument that was the focus of the researchers to review [28]. The PIF centered on the goal of contributing to Ethiopia's vision of being a middle-income country by 2020, aimed at sustainably increasing rural incomes and national food security. In addition, the objective included crucial issues related to increased production and sale, environment nurturing, hunger elimination, and protection of the vulnerable against shocks. Compared to other development programs, PIF is good at discussing the current management status of different natural resources, particularly soils, water, and land resources (focusing on watershed management) in the country. It is also good at articulating the integration of natural resource management, agricultural productivity, and poverty reduction. It also attempted to better articulate the causes of natural resource degradation.

Nevertheless, the contributions of the different farming systems to agricultural development in the planned ten-year were not been well articulated. In this respect, although high-value commercial crops such as horticulture and fruits, in addition to other crop types, were considered pertinent mechanisms to agricultural growth and development, the environmental consequences of the management to be used in each farming system were not well described. Consequently, no strategies have been developed to specify these details. While sufficient emphasis was given to enhancing the productivity of fruits and horticulture by improving the supply of fertilizers and irrigation development, there were no strategic pillars formulated to reduce the detrimental effects that would occur in water bodies, wetlands, and soil quality in these farming systems.

3.6. The ten years development plan

The current Ten-Year Development Plan of Ethiopia (2021–2030), is based on homegrown economic reform [29]. Homegrown economic reform aims to sustain rapid growth, maintain a stable macroeconomic environment by reducing debt vulnerabilities, and create adequate and sustainable job opportunities; therefore, it has been initiated domestically. The reform focused more on economic growth. The development objectives and strategic pillars of the plan mainly focus on economic growth, justice, and societal stability.

Agriculture development areas were identified in the plan under the agriculture development sector. Agricultural productivity enhancement and poverty reduction are the major objectives of agricultural development. In order to achieve these objectives, a range of target areas are identified and described. Some of these target areas have environmental consequences if special attention is not paid. For example, one of the target areas in the sector is to increase pesticide application to reduce invasive pests and control regular pests. Expansion and dissemination of medium and large-scale private farms, irrigation technology, horticulture production, etc., are some of the target areas which need technological changes or extra land, or both. These types of changes would cause environmental consequences. Nevertheless, strategic actions are not yet set that can reduce these effects. Accordingly, the plan specifies certain target areas. It is possible for farmers and pastoralists to reduce soil pollution by adopting improved technologies and practices.

Furthermore, the environment and climate change subsection of the plan has identified its focus area as sustainable development. For sustainable development, the country plans to enrich, maintain, and protect the natural environment, forests, wildlife, and other biodiversity resources. Sustainable utilization and maintenance of ecosystem interactions is the other mechanism targeted to achieve environmental management goals.

Generally, although the above considerations are taken into account in Ethiopia's national development, the environmental effects of the different farming systems are not sufficiently well addressed.

3.7. The FDRE Environment Policy

The FDRE Environment Policy was also assessed in this research. The policy has fixed an overall goal "to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through sound management and use of natural, human-made and cultural resources … " [14 p.3]. The goal and objectives of the policy have been founded on formulation of a policy framework that entertains both sectoral and cross-sectoral issues and guides sustainable development aspirations of the government. These issues focused on the environment, which has wide-ranging aspects. The policy listed 19 key principles. Within the different sectoral policies, efforts have been made to address questions related to assurance of economic benefit and sustainable environmental management. There are still a few issues in the policy that need to be addressed. The first relates to irrigation water use. The ways and quality of irrigation water affect the environment, particularly the soils and water bodies. However, the policy has no clear position in this regard. The second key point focuses on the value of demarcating buffer zones between water bodies and/or wetlands, and agricultural investment areas. Having a clear buffer zone between water bodies and investment projects will help minimize pollution and degradation of water resources and wetlands caused by soil sediments, chemicals, and other pollutants. The policy, however, failed to consider and set clear directions for this critical concern.

Chemicals as agricultural inputs are the other factors that pollute our natural resources and generally degrade the physical environment when poorly managed. To effectively manage and reduce their side effects, a clear policy must be in place. Despite this, the policy lacks clear strategic elements. Of course, in the agriculture sector, a very general and vague statement is written that states "[t]o safeguard human and environmental health by producing adequate regulation of agricultural (crop and livestock) chemicals" [14 p.8]. The statement is written in the policy related to chemicals use in agriculture. The other part that deals with environmental pollution focuses solely on hazardous materials and industrial wastes.

It is also unfortunate to forget that the environmental effects of farms and other economic activities vary with their type, location, and the technologies and other inputs used. In particular, the different farming systems, such as grain crop production, fruit farming, horticulture, etc., need to be analyzed based on the way they are managed. The inputs used have considerable positive and negative

impacts on the surrounding environment. All these, therefore, need rules and guiding principles when policies and programs are designed. However, the policy fails to take into account these types of considerations.

Furthermore, environmental pollution, particularly water pollution, has a critical impact on fishing. This is mainly where nearby farmlands are covered with crops that have been treated chemically with poor management. The policy said nothing about fish as an environmental component, and fishing as an economic sector sensitive to water pollution and wetland degradation.

4. Conclusion

Almost all development policies and programs of Ethiopia reviewed in this research focused on poverty reduction and rapid economic growth. The strategies outlined in the policies and programs to enhance farm productivity mainly focused on adoption and adaptation of new technologies, advancement of farm inputs, expansion of farmlands, etc. As these strategies were defined, their possible environmental consequences were not predicted, and mechanisms were not included in the policies to reduce their environmental consequences. Particularly, even though Ethiopia's economy relies heavily on agriculture, where a variety of farming systems are practiced, and which have multifaceted environmental consequences, the policies have not adequately addressed this relationship. Similarly, the national environmental protection policy in use also focused only on the environmental impacts of industrial expansion, large agricultural investments and urbanization. It outlined strategies presumed to solve the problem accordingly. However, the policy has likely failed to address farming systems' environmental consequences. The ecological effects of farm inputs such as irrigation water, fertilizers and chemicals, and buffer zone demarcation practices have not been considered in the policy. The policy didn't specify the location and application of the different farms and farming systems based on their impacts on the environment. In this regard, the policy is weak in outlining frameworks that clearly show the pathway to ensuring integrated economic growth and ecological sustainability. Generally, the development policies did not give adequate emphasis to the economic development-environment interrelationships.

Author contribution statement

Tadesse Dejenie: Analyzed and interpreted the data.
Tirfu Kakiso: Analyzed and interpreted the data; Wrote the paper.

Data availability statement

Data will be made available on request.

Ethical approval and consent to participate

The authors collected the necessary data from the study area with the approval of concerned stakeholders and participants' full consent. Apart from this, the research deals with the livelihood impacts of apple production; and it did not touch any sensitive and animal-related issues.

Declaration of competing interest

The authors declare no conflict of interest.

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