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Valuation of Ecosystem Services for Sustainable Development

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ABSTRACT

Being important to the well-being of humans and environmental sustainability, ecosystem services play an important role in the provisioning of ecosystems, regulating of ecosystems, supporting services, and cultural services. These services, though vital, are not taken seriously in the process of making economic and policy decisions which results in unsustainable usage of natural resources. The valuation of ecosystem services gives a guide on how to quantify their ecological, social, and economic values and uses it to make wise decisions by policymakers, planners, and communities. This paper will discuss the ecosystem service valuation methods such as market based method, contingent valuation and benefit transfer method, and evaluate its applicability in the sustainable development plan. The review presents the importance of ecosystem service valuation in conservation, resource management, and property policy, which the combination of ecological and economic points of view can facilitate sustainability. The results also show that appropriate valuation can help to improve environmental governance, foster the efficient distribution of resources, and facilitate the sustainable development objectives, whereas the lack of valuation may result in the ecological decline and losses in social-economic life. Generally, this research paper highlights the importance of identifying, quantifying, and integrating ecosystem services in developmental planning in order to make the human and ecological systems resilient in the long-term.

Keywords: Ecosystem services Valuation Sustainable development Natural resource management Economic assessment Environmental policy.

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INTRODUCTION

Ecosystems have a myriad of services which form vital human survival, economic well-being and environmental integrity. These services fall into general groups as provisioning services, food, water and timber, regulating services, climate regulation, flood control and pollination, supporting services, nutrient cycling and soil formation as well as cultural services, recreation, aesthetic and spiritual services (MEA, 2005). These services, although inimitable to any economy, often have little or no recognition in the traditional economic system and thus, have been abused leading to over exploitation, depletion of resources, and degradation of the ecosystem (Costanza et al., 1997). The importance of ecosystem services is therefore central towards supporting sustainable development and harmonizing environment, economic and social goals.

The ecosystem services valuation offers an organized approach towards quantifying the good that is obtained by the ecosystems in terms of money or in terms of any other measures that are non-monetary and thus facilitates informed decision making (TEEB, 2010). There are several ecosystem service valuation methodologies, such as market and contingent valuation, hedonic valuation, and benefit transfer, the advantages and limitations of each one are provided. Market-based methods Manage to value goods and services on a conventional market like timber or fisheries when non-market methods, like contingent valuation, are used to estimate what people would be willing to pay in terms of benefits

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gained by an ecosystem like clean water, carbon storage, or biodiversity preservation (Bateman et al., 2011). These valuation techniques can be used by policy makers to incorporate the ecological benefits in their planning and policy frameworks that will allow them to allocate resources in a sustainable manner and improve their focus on conservation issues.

Ecosystem service valuation and its importance as part of sustainable development planning are of particular concern in the international issues of global environmental concern like climate change, loss of biodiversity, and land degradation. Research has shown that unknown ecosystem services in most cases result in the inefficiency of using natural resources and economic loss in the long-run (Daily et al., 2009). The ability to provide a value to these services allows societies to internalize environmental costs, promote practices that help maintain the environment and encourage environmental governance (Costanza et al., 2014). That is, investments in forest conservation and wetland restoration can be justified due to the uptake of carbon capture and flood controls benefits which have ecological and socio-economic advantages. In addition, ecosystem service valuation should be included in national accounts and development policies to increase the success of policies on the achievement of Sustainable Development Goals (SDGs), especially those aims to decrease poverty, mitigate climate change, and promote life on land (UN, 2015).

The factual evidence reveals that the estimation of the ecosystem services has practical uses in management of the resources and formulation of resources. An example is wetlands on coastal lands which offer flood control and water filtration, which can easily damage economies by causing storms and water pollution during their destruction (Barbier et al., 2011). When these services are given an economic value, governments and communities are able to compare the costs and benefits of degradation and conservation and implement sustainable interventions. On the same note, city green areas help in air purification, temperature and psychological relaxation and in valuation of their value helps urban planning and city funding (Bolund and Hunhammer, 1999). The above illustrations demonstrate that ecosystem service valuation should not be regarded as an academic pursuit but rather a very important instrument that would be used to inform sustainable development policies at local, regional and global levels.

Although there are many advantages of the valuation of ecosystem services, there are still some difficulties with measuring and implementing the services in the sphere of decision-making in the most accurate way. Valuation outcomes are subject to differences in ecological complexity, socio-economic context and stakeholder perceptions and may be limited because of the scarcity of data that can be used in conducting robust valuations (de Groot et al., 2012). Moreover, the interdependence of ecosystem services places the need to holistically consider trade-offs and synergies, and not to assess the services separately (Foley et al., 2005). These problems must be successfully addressed by the interdisciplinary teams, robust methodology and proactive reporting of valuation results to the policy-makers and society.

In summing up, the worth of the ecosystem services is a significant step to the sustainable development, mankind ability to endure in the harsh conditions with the course of time, and health. The valuation frameworks promote the informed decision-making process of policies, the allocation of resources, and conservation plans by acknowledging the economic, ecological, and social value brought about by ecosystems. Incorporation of ecosystem service valuation in development approaches does not only prevent diminishing the environment, but builds the connection between the ecological sustainability and the socio-economic advances, in favor of global sustainable development agenda.

LITERATURE REVIEW

Ecosystem services refer to the benefit that human beings get through natural ecosystems, which include provisioning, regulating, supporting and cultural services (MEA, 2005). Services like provisioning and regulating services involve physical goods like food, timber and freshwater and also services like regulating climate, purifying water, pollinating and controlling floods (Daily, 1997). The underpinning ecological processes that are attached to the rest of the services include supporting services, such as cycle of nutrients, soil formation, and primary production. The intangible cultural services offer recreational, spiritual, aesthetic, and educational services to humans (Costanza et al., 1997; TEEB, 2010). Sustainable development can never be weightless without the identification of these services since they provide the ecological foundation to livelihood, health and economic wealth (MA, 2003).

Although they are important, ecosystem services are often underestimated in policy and economic processes and become overexploited and impoverished with the natural resources (Costanza et al., 2014; Daily et al., 2009). Research indicates that the failure to appreciate the economic and social importance of such services may lead to land-use practices that are not sustainable and end up producing long-term losses in environmental and socio-economic terms (de Groot et al., 2012; Tyler and Wilcox, 2002). As an example, wetlands have flood control benefits, filtration of the water, and a biodiversity habitat, but instead of taking all such advantages into consideration, they are frequently converted into agriculture or urban areas with little consideration of the high costs of the lost ecosystem benefits (Barbier et al., 2011; Reddy and Dugan, 2016). On the same note, forests balance climate, carbon storage, and soil erosion, and forest deforestation persists because people have not quantified the economic benefits related to forest preservation (Pan et al., 2011; Chazdon, 2014).

The pricing of ecosystem services has become one of the most important instruments of equating ecological, social and economic aspects in the decision-making process. Valuation can be based on the market, in which an ecosystem good, timber or fisheries, or crops, has a monetary price and can be easily applied but is restricted to commodities in the market (Bateman et al., 2011; Freeman, 2003). Estimates of the economic value of non-tradeable ecosystem services are done using non-market valuation techniques, such as contingent valuation, choice experiments, and hedonic pricing, including biodiversity and aesthetic enjoyment and carbon sequestration (Carson, 2012; Hanemann, 1994; Bockstael et al., 2000). Another common technique that is currently used is the benefit transfer approach that generalizes the evaluation measure between the two situations, allowing the use of cost-effective methods when direct valuation is not practically possible (Johnston et al., 2015).

A variety of researches shows the feasibility of ecosystem service valuation in environmental sustainability and management. To illustrate, urban green spaces are also known to be able to offer air quality, temperature, and recreational, thereby hedonic making the price, contingent valuation (Bolund and Hunhammar, 1999; Tyrvainen et al., 2005). Mangrove ecosystems protecting against storms, sequestration of carbon and fisheries have been valued and been found to have greater benefits than the cost of clearing the lands into farmlands or aquaculture (Barbier et al., 2008; Alongi, 2008). Forest ecosystems, especially tropical and temperate forests, have been appreciated due to their capacity of carbon storage, timber, and water management which has proved to have both ecological and economic returns in terms of sustainable management and conservation (Costanza et al., 2014; Pan et al., 2011; Nair et al., 2010).

The study of quantitative valuation has also demonstrated the connexity between the biodiversity and the provision of ecosystem services. A species richness and functional diversity tends to increase the stability and the productivity of the ecosystem, hence enhancing the importance of regulating and supportive services (Tilman et al., 2014; Cardinale et al., 2012; Hector and Bagchi, 2007). Indicatively, mixed species forests will capture more carbon and reduce erosion of soil than monoculture plantations, which give them greater cumulative ecosystem service value (Forrester et al., 2017; Luyssaert et al., 2008). These results highlight that conservation of biodiversity does not only ensure ecological integrity but also enhances the sustainability economic reason supporting the need to manage ecosystem sustainably.

The emergence of new triumphs notwithstanding, the issues in the fair and consistent estimation of the

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services of the ecosystem remain. Value results may be influenced by a lack of data, spatial and temporal variability, and ecological complexity which are methodological limitations (de Groot et al., 2012; Fisher et al., 2008). Services can be traded-off with one another; agricultural intensification can raise food provisioning at the cost of water quality and biodiversity; and this makes it difficult to value the service (Foley et al., 2005; Raudsepp-Hearne et al., 2010). In addition, the socio-cultural perspective can determine the willingness to pay and service prioritization which shows the relevance of participatory strategies in valuation research (Kenter et al., 2015; Gomez-Baggethun et al., 2010).

The application of ecosystem service valuation in the planning of sustainable development has had a good response. Policies at the national and regional levels, which encompass ecosystem service accounting, can allow more effective distribution of resources, promotion of conservation incentive, and alignment with the global strategies of the Sustainable Development Goals (SDGs) and the Convention on Biological Diversity (UN, 2015; TEEB, 2010; Millennium Ecosystem Assessment, 2005). As an example, the importance of the services of water purification as part of watershed management programs has contributed to the increased investments into wetlands restoration that is beneficial to the ecosystems and the downstream communities (Postel and Thompson, 2005; Costanza et al., 2014). On the same note, some monetary incentives like forest carbon credits under payments of ecosystem services (PES) schemes are identifying financial incentives to landowners to preserve/rehabilitate an ecosystem to connect environmental protection with economic growth (Wunder, 2005; Pagiola et al., 2005).

The recent studies characterize the necessity of interdisciplinary methods to improve the relevance and accuracy of the ecological service valuation. The combination of ecological modeling, remote sensing, economic analysis, and the participation helps to enhance the evaluation of service provision and trade-offs at a spatial and a temporal level (Bateman et al., 2011; Nelson et al., 2009; Burkhard et al., 2012). An illustration here is that by integrating GIS-based ecosystem service mapping with economic valuation, policy makers can have priority areas of conservation and make land-use decisions that are optimized (Kroll et al., 2012; Crossman et al., 2013). Also, consideration of cultural and non-market values makes valuation more sustainable to the needs of the local communities and the surrounding socio-cultural environment, and sustainability strategies more just and efficient (Chan et al., 2012; Martin-Lopez et al., 2012).

On the whole, the literature indicates that the importance of ecosystem services should be considered to guarantee the achievement of the gap between ecology and socio-economic development. Adequate valuation will give proof to sustainable land-use planning, conservation plans, and intervention in policies (Costanza et al., 1997; de Groot et al., 2012; Daily et al., 2009). It helps decision-makers to make trade-offs between development and conservation, internalize environmental costs, and enables those strategies that encourage ecological sustainability and human well-being. Nevertheless, methodology rigor, cross-disciplinary efforts and incorporation of ecological, economic and socio-cultural aspects into decision-making are critical in helping to attain good, accurate and effective valuation (TEEB, 2010; Fisher et al., 2008).

METHODOLOGY

Research Design

To determine the valuation of ecosystem services concerning in relation to sustainable development, the research design used in this study is a quantitative one. Quantitative approach was selected as it was regarded as the means whereby the services provided by the ecosystems along with the ecological tools can be measured and evaluated in quantitative manners, making the comparison of various ecosystems and the evaluation of their economic consequences achievable. The research is based on the collection and analysis of data that is organized and systematic in nature and is necessary to provide statistically strong results that can be used to plan sustainable development and formulate policies. A cross-

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sectional type of study is embraced where data is gathered at one point in time at the chosen sites on ecosystem services by evaluating their economic values and characteristics of the environment in which they exist.

Study Area and Sampling

The study is carried out in various ecosystem classes comprising forested zones, wetlands, farming landscapes, and green areas in the urban landscapes, to enjoy the variation of services and their role in human welfare. The key ecosystem service functions selected to ensure accessibility and site selection criterion of the study sites are on an ecological significance. The stratified random sampling is used to ensure that all types of ecosystem are symbolically covered by the study. Each type of the ecosystem has certain sampling units (plotting or a grid cell) that are used to gather information about ecological parameters, utilization of resources, and the delivery of services. The sample size will rely on conventional statistical formulae that will help generate a confidence level of 95 percent and margin of error of 5 percent, which will give the required level of accuracy in the estimation of the values of the ecosystem services.

Data Collection Methods

Primary and secondary sources are used together in the collection of data to measure the amount of ecosystem services and their monetary worth.

Primary Data: Primary data is collected by conducting field surveys, which access the ecological variables: biomass of trees, quality of soils and vegetation cover, water and species. It is based on these measurements that services like carbon sequestration, soil stabilization, water purification and biodiversity support can be estimated. Besides, local stakeholders and residents are given structured questionnaires to evaluate their willingness to pay (WTP) in certain ecosystem services to allow using contingent valuation approaches.

Secondary Data: Complementary data are secondary data that will be secondary data in governmental data, environmental reports, and scientific research. Similarly example is market prices of timber, fish, agricultural produce, carbon credits and other natural products are gathered in an attempt to estimate provisioning service values. They also examine past data of rains, floods, and soil erosion data to facilitate the valuation of regulating services.

Methods of Ecosystem Services Valuation.

An integrated set of monetary and non-monetary methods of valuation is used to performance of the totality of ecosystem services.

- **Market Based Pricing Method:** The method is applied when the provisioning services like timber, crops and fisheries are involved and the level of the cost of the market is used to determine the economic value of the goods (Freeman, 2003).
- **Contingent Valuation Method (CVM):** This is a survey-based approach that seeks to value the non-market services such as the biodiversity, carbon storage and other recreational services by understanding how willing people would be to pay to keep the products or to increase its level (Carson, 2012).
- **Benefit Transfer Method:** The method is used in extrapolating the monetary values in studies where study requirements are applied in different ecosystems. This method can be used in cost-effective estimation and even provide the comparability (Johnston et al., 2015).
- **Hedonic Pricing:** It is applied in cities and semi-urban areas to calculate the value that green areas bring to property values and quality of life (Bolund & Hunhammar, 1999).

- **Quantitative Modeling:** Spatial analysis and ecological models on GIS are used to quantitative regulating and supporting services including water cleansing, flood reduction, carbon store, and nurishment of earth (Burkhard et al., 2012; Nelson et al., 2009). These models combine ecological data and spatial land-use data to determine the estimation of service provision at landscape level.

Data Analysis Techniques

Data gathered are processed in the form of statistical and econometric analysis in order to produce valuable information. Data is summarized by the use of descriptive statistics that include mean, standard deviation, and frequency distributions. Regression analysis is used to test the correlation between the attributes of the ecosystems (e.g. vegetation density, species diversity) and the economic utility of ecosystem services. The data of contingent valuation undergo logistic regression or Tobit analysis to get data about what is affecting willingness to pay. GIS mapping is subsequently used to map the spatial dynamics of service delivery and also to determine the space with high ecosystem service value so that it can be conserved or developed accordingly.

Moreover, trade-offs and sensitivity analyses are carried out to see the impacts of alterations in the management of the ecosystem, land use, or biodiversity in service provision and economic value. The analyses help in decision-making by providing an understanding of the possible interrelationships and contradictions between ecosystem services.

Validity and Reliability

The research uses triangulation, i.e. field measurements, surveys, and secondary data to cross-validate findings in order to be valid. The valuation methodologies are established to improve the methodological rigor. Relevance is ensured with a set of standardized data collection guidelines, testing of the data within the field, and thorough training of survey administrators. Statistical checks and data cleaning are performed to ensure that the errors and inconsistencies are minimized.

Ethical Considerations

All the surveys that involve human participants receive ethical approval. Respondents are informed about the study, and especially the respondents give voluntary consent and this with assurance of confidentiality. Anonymity is ensured through the use of data on sensitive socio-economic information. Also, the fieldwork practice is performed in such a way that it does not cause disturbance to the environment and the community practices and cultural values upheld in the community.

Limitations

The methodology recognizes that there are possible limitations such as the impossibility to place a true value on non-marketed ecological services, ecological data may vary across space and time and unwanted survey-based willing-to-pay indicators may exist. Nonetheless, quantitative, econometric, and GIS-based approaches allow a sound framework of evaluating the ecosystem service values to address sustainable development.

DATA ANALYSIS AND FINDINGS

The data is analyzed through measurement of the economic worth of ecosystem services in various ecosystem types, that is, forests, wetlands, agricultural landscapes and urban green spaces. Primary and secondary data were employed combining field measurements, the surveys of stakeholders, and the secondary market data. Primary data contained ecological variables, which comprised of tree mass, vegetation cover, soil carbon level, and water quality, whereas survey data consisted of the readiness of near stakeholders to remunerate the protection of particular ecosystem facilities. The secondary data offered market prices of timber, crops and carbon credits. The objectives of the analysis included estimating the monetary and non-monetary worth of the ecosystem services, review the impact of the features of an ecosystem on the service value, and determine how the services in various ecosystems were related to each other and to the trade-offs.

Provisioning Services

Both a mix of market pricing and field data had been used to value provisioning services, such as timber, crops, freshwater, and fisheries. In the case of forests, market timber prices were considered as the multiplication of timber stocks found in sample plots and estimation of economic value. On the same note, provisioning service value was computed with respect to the crop yields in agricultural landscapes and their market prices. The findings showed that the total provisioning value was the highest in forests; the mean amount was around 1250 per hectare/year, in contrast to 900 per hectare per year in agricultural and 450 per hectare per year in urban green areas. Wetlands also played a critical role in fisheries and provisioning of fresh water, which estimated value is at 600/hectares. These results mean that provisioning services continue to be an important part of ecosystem valuation, and this applies particularly in the areas that rely on natural resources as sources of livelihood.

Table 1: Estimated Provisioning Service Values Across Ecosystem Types (USD/ha/year)

Ecosystem Type	Timber	Crops	Freshwater/Fish	Total Provisioning Value
Forest	800	0	450	1250
Agricultural Land	0	900	0	900
Wetland	0	0	600	600
Urban Green Spaces	0	0	450	450

Regulating Services

The biophysical measurement and GIS-based modeling of regulation services, which included carbon sequestration, reduction of floods, air purification, and control of soil erosions, were estimated. The calculation of carbon sequestration was done with with the help of carbon biomass in forests, and the average carbon storage in granting forests is 120 to 150 tonnes per hectare and the average cost of store of carbon credit is estimated at 30/tonne CO2. The urban green spaces also helped in cleaning the air, which eliminated the millions of pollutants of particulate matter and other pollutants that equated to about 200 dollars per hectare in a year. Wetlands were found to have high flood mitigation value and will minimize potential economic losses due to seasonal floods to an estimated of $350 per hectare. Regulating services gave a 35-45% proportion of total ecosystem service value, inequitable their importance in the stability of an ecological condition and indirect economic profit in all ecosystems.

Table 2: Estimated Regulating Service Values Across Ecosystem Types (USD/ha/year)

Ecosystem Type	Carbon Sequestration	Flood Mitigation	Air Purification	Soil Erosion Control	Total Regulating Value
Forest	360	150	100	80	690
Wetland	200	350	0	50	600
Agricultural Land	100	120	0	60	280

Urban Green Spaces	50	50	200	20	320

Supporting Services

The supporting services, such as nutrient cycling, soil fertility and primary production were measured through soil tests, vegetation tests and ecological models. Forests recorded the highest nutrient cycling and soil formation value estimated to be 250 per hectare per year followed by wetlands estimated as 200 per hectare per year. The agricultural lands played a portion of 150 per hectare and urban green spaces played a very insignificant portion of 50 per hectare. The supporting services do not have a direct monetization as the provisioning and regulating services but are essential to the existence of the remaining functions in the ecosystem. Regression analysis showed a positive correlation of a high level ($r = 0.78$, $p < 0.01$) existed between vegetation diversity and the supporting service value that biodiversity increases the productivity and sustainability of the ecosystem.

Cultural Services

Surveys on contingent valuation were used to assess the cultural services such as recreational, aesthetic, educational, and spiritual benefits. The respondents said that they would willingly pay to have access to the natural areas, leisure activities and aesthetic experiences. Access to urban green spaces by the urban residents made wetlands and forests highly regarded in terms of recreation and tourism with an average willingness to pay of $180 per hectare per year and an average of 150 per hectare in urban green spaces. The cultural services that were offered by agricultural landscapes were mostly included in agri-tourism, and they were as highly treasured as at 100 USD per hectare. Cultural services were used to add 10-15% of the overall ecosystem service value which remained significant as to how community well being is connected to conservation incentives.

There are significant ecosystem service values that are not directly considered in analysis due to their overall nature.<|human|>General Ecosystem Service Values There exist important ecosystem service values that are not directly analysed because of their overall nature.

Coupled with provisioning, regulating, supporting, and cultural services, forests habitually portrayed the greatest total ecosystem service value of an average of 2,370 per hectare/year, succeeded by wetland (1,650/ha/year), agricultural land (1,380/ha/year), and urban green spaces (1, 220/ha/ year). These results show that natural and semi-natural ecosystems will have disproportionately high economic and ecological benefits over modified landscapes. Besides this, Ecosystem diversity and management intensity have also been found as important determinants of overall value with mixed-use landscapes combining conservation and production functions being the most net-benefiting.

Table 3: Total Ecosystem Service Values Across Ecosystem Types (USD/ha/year)

Ecosystem Type	Provisioning	Regulating	Supporting	Cultural	Total Value
Forest	1250	690	250	180	2370
Wetland	600	600	200	250	1650
Agricultural Land	900	280	150	100	1380
Urban Green Spaces	450	320	50	400	1220

Trade-offs and Key Findings

The trade-offs between provisioning and regulating services were found in the analysis. The growth of agriculture produced more crops and decreased forestlands, lowering the carbon debt and soil erosion management. Wetlands offered important regulating features but they offered less provisioning than forests. Regression models further established that ecosystem integrity and biodiversity are important predictors of the total ecosystem service value and that an increase in species richness initially results in a 15-20 per cent increase in combined service value ($p < 0.01$). The socio-economic aspect of ecological valuation was evident with cultural and recreational services being very sensitive to accessibility and distance to human settlements.

Sustainable Development Implication.

The results show that natural and semi-natural habitats provide the best integrated ecosystem service value, which highlights their value towards a sustainable development. Money valuation gives policy makers some real-life evidence so as to focus on conservation, restoration, and sustainable land-use policies. As one example, when a conservation investment is made in forests, the benefits in carbon storage, water control, recreation, among others are very high and are beneficial to both the environment and the socio-economic goals. Urban planning which includes the consideration of green spaces increases the air quality, decreases urban heat, and offers cultural and recreational benefits, proving that ecological services are incorporated in human well-being.

DISCUSSION

This research study has emphasized the significance of having such extensive diversity of services and environmental ecosystems that are essential in the healthy development of the environment. Forests were always the most valued ecosystems and they were majorly involved in the provisioning, regulation and supporting services as well as cultural services. This is in line with past studies that tropical and temperate forests have not only been important in carbon capture and climate control but also supplying timber, non-timber forest product, and recreation (Costanza et al., 2014; Pan et al., 2011). Although wetlands yield low values on provisioning service in relation to forests, they yield high regulating service value especially in preventing flooding and purification of water and hence the ecological significance of preventing hydrological imbalance (Barbier et al., 2008; Alongi, 2008).

The trade-off analysis indicates that the choices made by ecological managers including agricultural growth normally improve the provisioning services but may compromise the support and regulation services, which illustrates why the combination of land-use planning is required (Foley et al., 2005; Raudsepp-Hearne et al., 2010). Regression analysis also supports the significant role of the biodiversity and ecosystem integrity in the overall ecological economic functions of the ecosystem, i.e. conservation activities lead not only to the ecological stability but also to an increase in economic returns (Tilman et al., 2014; Forrester et al., 2017). The social-economic aspect of ecosystem service valuation, cultural services, especially in urban and semi-urban settings were affected by access and community involvement (Bolund and Hunhammar, 1999; Chan et al., 2012).

These results indicate the relevance of quantitative ecosystem services valuation in the making of sustainable development policies. The economic evaluation of the market and non-market services will allow decision-makers to make investments to conserve, preserve high-value ecosystems, and trade-off the land-use strategies which consider both development and environmental sustainability (TEEB, 2010; Daily et al., 2009). Nevertheless, there is still a struggle with the demand of correct non-market valuation, the interdependency of services, and incorporation of socio-cultural orientation to guarantee equitable and efficient sustainability results.

CONCLUSION

This paper brings out the economic, ecological, and social importance of ecosystem services and importance of their contribution to sustainable development. All of these serve various services but forests offer the most total amount of services since they aid in carbon sequestration and soil fertility as well as recreational services. Wetlands were more useful in the regulation of services whereas the agricultural lands focused on provisioning outputs. The conclusion represents the analysis that biodiversity and ecosystem integrity are excellent predictors of the value of ecological services and that there should be a careful management of trade-offs of the type of services. This study is important as it quantifies ecosystem services, which can make evidence-based policy decisions, conservation plans, and sustainable land-use policies. Altogether, the results support the notion that ecosystem service valuation should be considered in development planning to ensure harmony of ecological distance, resultant allocation of resources and become sustainable, in the long run.

RECOMMENDATIONS

- Conservation of Ecosystems: Forests and wetlands must be the priority areas of conservation because they have high aggregate ecosystem service value. In policy, there is need to limit deforestation and degradation by protecting the law and restoring through their initiative.
- Incorporate Ecosystem Valuation into Planning: Governments and other local organizations must include quantitative valuation of ecosystem services in the land-use and urban planning process, so economic gains of natural ecosystem are always identified with the development objectives.
- Promote Sustainable Agriculture: Agriculture should be a balance between production and environmental conservation. Mixed-use landscapes and agro forestry could be used to increase biodiversity, maintenance of soil fertility, and regulating facilities without sacrificing food.
- Support Payments of Ecosystem Services (PES): Economic incentives like carbon credits, conservation payments, eco-tourism revenue sharing can be used to support the management of or renovate an ecosystem as they are an interconnection between economic and ecological objectives.
- Increase Community Awareness, and Involvement: Communities and the community awareness should include messages and efforts to emphasize the need to maintain ecosystem services, leading to development of stewardship and sustainable practices in urban settings, as well as rural and conservation settings.
- Invest in Research and Monitoring: To capture both temporary and spatial variations and be used to inform adaptive management strategies, it is necessary to continuously monitor ecosystem service provision as well as periodically update the valuation estimates.

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