

FORMULATING A SUSTAINABLE MANAGEMENT PLAN FOR THE NATURAL RESOURCES OF THE BASIN INCLUDING ITS FORESTS

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ABSTRACT

By focusing on both direct and indirect causes of deforestation and ecosystem degradation, this plan hopes to optimize critical ecosystems' ability to mitigate climate change. For this Plan to succeed, the United States and its allies will need the will, resources, and resolve of all countries that cover key ecosystems to conserve and restore these ecosystems and accomplish their ambitious climate targets. The ability of people to adopt new ways of behaving that put an emphasis on climate action and ecosystem conservation, and the readiness of businesses throughout the world to adopt innovative methods of financing and doing business, are all necessary for the success of our collective initiatives. The goal of this plan is to speed up this international initiative. By increasing investments in economic development models and policy frameworks that provide positive incentives to conserve critical carbon sinks and disincentivize their loss, this Plan seeks to ensure that conservation and restoration of these essential ecosystems is the least expensive option and in the economic interest of key stakeholders. It will encourage a variety of land-use patterns that are compatible with climate and conservation goals, such as parks, Indigenous lands, and agricultural landscapes.

KEYWORDS: Deforestation, Economic, Development, Landscape, conservation

INTRODUCTION

Globally and locally, sustainable management of natural resources is a major social issue. The phrase "natural resources" is used here in a wide sense to include not only raw materials but also biological variety, water, air, and soil. The recycling of trash into secondary raw materials is essential in the modern concept of natural resources, despite the fact that garbage is not often considered a natural resource. The purpose of the 2017 European Environmental Law Forum Conference, held in Copenhagen at the end of the summer, was to shed light on the role that legal instruments and methods play in fostering sustainable management of natural resources. As the results are beneficial to Rwandans and other populations throughout the globe, the management difficulties they are experiencing may be solved locally or in conjunction with the international community. As part of its conservation effort, Rwanda wants to increase its forest cover to 30 percent of the country's total land area by 2020 via afforestation and replanting. To meet the demands of the populace for biomass energy, lumber, and service wood, 18.7% of the land area has been set aside as forest plantations. It's also important to note that agroforestry has a complementary function to the one just described. Private and public forests will use the Forest Management Unit (FMU) method, which defines a defined area as a collection of distinct forest stands that together form an economic unit to be managed sustainably.

Ecological sustainability and social ecological resilience are difficult concepts to incorporate into policy and legislation, particularly in light of the persistent pursuit of growth in the wake of the financial crisis. Sustainable management of natural resources may also be supported by a variety of legal tools and methodologies. Some of the difficulties in designing environmental

regulations and in carrying them out and enforcing them are explored in this collection of essays.

LITERATURE REVIEW

Mukete Beckline et.al (2022) This research looks at the dynamics of forest conservation and the resulting difficulties in Cameroon. Forest resources are evaluated, and trends in forest conservation as well as the many obstacles faced by such efforts are uncovered. In order to do this, we conducted a comprehensive literature study utilizing the resources available at Semantic Scholar, Google Scholar, Research gate, and Web of Science. The research found that there are still significant difficulties that lead to rapid forest loss despite the use of diverse management strategies. Agricultural practices, forestry, and urbanization that are not sustainable are mostly to blame for this (settlement expansion). According to this study, the scarcity of farmable land, the difficulty in gaining access to forest resources, the inability to find other reliable sources of income, and the increasing demand for NFPs are all major contributors to deforestation. Forests can be better managed with the correct tools, cooperation and aid from law enforcement, and input from local residents, this research found that forest management can successfully react to the challenges arising from forest loss.

Neha Tayagi et.al (2021) As a result of rapid use, nonrenewable resources must be preserved (conserved) to prevent a shortage in the future. Natural resources are often scarce. meaning they will deplete over time. Promote water usage optimization and source protection and restoration. Having to treat wastewater before dumping it or using it again is a must. The reduction of carbon emissions and the increase of carbon reserves need your help. Encourage trash avoidance, recycling, and proper disposal. Sustainable development is progress that satisfies the requirements of the present without compromising the standard of living that will be enjoyed by future generations. As a result, natural resources may be better managed via their use and conservation.

Christopher Dickens et.al (2020) The primary objective of the Sustainable Development Goals (SDGs) is to achieve a balance between environmental, social, and economic considerations in all published reports, and they use more than 231 different indicators to accomplish so. This paper's assessments are grounded on the research topic of whether or not the SDG indicators are adequate for their intended purpose of gauging the sustainability trajectory of natural resources. To determine if the Sustainable Development Goal (SDG) indicators that monitor the state of natural resources or provide policy or governance support for their preservation contain sufficient data, we eliminated them. There are four types of natural resources that the indicators are classified under: land, water, air, and biodiversity. The quality of soils, the condition of vegetation outside of forests and mountains, and the overall health of terrestrial ecosystems are not being examined, even though the most comprehensive indicator of degraded land is not being employed and indicators for monitoring land resources imply as much. Water quality, water stress, many characteristics of marine resources, and most importantly the health of fresh and salt water ecosystems are not adequately monitored by current indicators for water resources. Although improvements have been made in the breadth and depth of air quality monitoring indicators, both programs would benefit from being linked to IPCC findings. The lack of a holistic evaluation, even if certain components are monitored, in regards to biodiversity monitoring is likely the largest shortcoming of the SDG Agenda. Once again, if data can be established on a country-by-country basis, it is encouraged to intentionally connect to other global biodiversity projects. While the list of natural resource SDG indicators is fairly comprehensive, The SDG Agenda is at risk because critical metrics of

sustainability, such as ecosystem and biodiversity assessment, are not included in the current monitoring framework. An further increasing problem is that not enough data is collected at the national level to conduct a thorough evaluation of sustainability, even in cases when the proper indicators exist. This highlights the fine line between the breadth and depth of the SDG Agenda and its actual implementation in individual countries.

Kariuki Muigua (2019) Both the human-centered and ecological perspectives on sustainable development place a premium on protecting and preserving natural resources and the natural environment. The human race relies on these resources more than any others to survive. Most of these resources, however, are limited and must be managed sustainably to ensure the well-being of both present and future generations. Hence, Several options for achieving these goals are provided by existing international environmental legal and institutional frameworks. This study analyzes these strategies in the context of Kenya and argues that, although each strategy has merits, none can accomplish the sustainable development objectives on its own. Instead, the research advocates for an integrated strategy that draws on the best features of each strategy.

Nophea Sasaki et.al (2016) The REDD+ project of the United Nations Framework Convention on Climate Change has created new possibilities for the sustainable management of tropical forests for timber harvesting and the mitigation of carbon emissions. We evaluated two logging processes throughout a 40-year period of selective logging, looking at possible wood yield and reductions in carbon emissions. In tropical production forests (PdF), We found that reduced-impact logging (RIL) alone could supply 45% of global demand for round wood, which is equivalent to avoiding 29-50% of net emissions from tropical deforestation and land use change. Using RIL with additional improvements (RIL+) in forest management and wood conversion procedures may increase long-term carbon storage in sawn-wood by 14-184% and reduce logging-induced fire-prone wood wastes by the same amount. Premature re-entry logging may be avoided if parties are financially incentivized to implement RIL+ at a rate of around US\$2 billion per year, or \$1.86 per Mg CO₂. Based on our research, we conclude that RIL+ should be expressly included in future climate policies in order to meet the "sustainable management of forests" carbon in wood products must be considered for trade credit under the REDD+ system.

MANAGEMENT OF FOREST

It's important to think about whether or not the aforementioned groups' forest-management aims are compatible with one another. The local population is routinely denied access to forest resources while corporations are given them at prices much below their true market worth. The grassroots Chipko Andolan ('Hug the Trees Movement') was formed to reunite forest dwellers with their natural habitat. The event that sparked the movement happened in the early 1970s in a little hamlet named Reni in Garhwal, deep in the Himalayas. The residents had a disagreement with a logging contractor that had been given permission to clear cut trees near their community. While the guys were away, the contractor put in his crew to chop down trees from the forest. The ladies of the community hurried to the forest and, although being outnumbered, succeeded in stopping the workmen from cutting down any trees by clasping their hands around their trunks. As a result, the contractor was forced to back out.

The protection of a renewable resource is intrinsic to a struggle for its control. The technique of application was specifically questioned. The contractor would have cut them down, thereby eliminating them from existence. Communities often cut down trees and harvest their leaves, with the expectation that the trees would eventually regenerate. Rapid media and community

coverage of the Chipko movement helped to convince the government—which owns the forest—to shift their focus on how they value and utilize forest resources. Deforestation has been shown to negatively impact more than just the supply of forest products; it also degrades soil and water supplies. Moreover, effective forest management may result from community involvement.

An Example of People's Participation in the Management of Forests

In 1972, the West Bengal Forest Department admitted that it had been unable to restore the Sal woods in the state's southwestern regions. Disputes between forest rangers and local residents were commonplace because of the previous administration's tendency to use heavy-handed tactics in order to maintain order. Militant peasant uprisings headed by the Naxalites were fueled in large part by disputes over land and forests in the area.

As a result, the Department shifted its approach, starting in the Midnapore district's Arabari forest region. A visionary forest inspector named A.K. Banerjee insisted that the local people help preserve 1,272 acres of severely deteriorated sal woodland. Those who helped safeguard the area were offered jobs in silviculture and harvesting in exchange for a share of the final crop (up to 25%), as well as access to gather fuelwood and fodder for a small charge. Arabari's sal woodlands revived remarkably thanks to the help of the neighborhood; by 1983, a once-worthless forest was worth Rs 12.5 crores.

THE PURPOSE OF NRM PLANNING

Managing the natural resources locally

For the last three decades, decentralization has been the dominant policy tendency in most emerging nations. This entails devolving environmental management duties to municipal governments (LGUs). To help local governments, communities, and other stakeholders chart their own route for development, several new participatory techniques have emerged in recent years.

Decentralization has paved the way for the widespread use of participatory methods in NRM. In particular, the provincial/municipal-led NRM planning strategy seeks to provide LGUs with the tools they need to drive community-wide NRM planning and execution. It expands on the idea that LGUs and communities are the best sources of information on NRM in their areas. When people work together to solve an issue, they do it from inside, once they have gained an understanding of the true nature of their respective contexts.

Role of facilitators

Planning for NRM is greatly aided by facilitators. They act as a "facilitator," or a person who helps organize and run, meetings, seminars, negotiations, and advocacy efforts. They facilitate better planning by making it simpler and easier for all participants to make meaningful contributions to each activity. Facilitators, in particular, are responsible for the following tasks:

- Facilitate improved decision-making by the regional planning group by serving as a "catalyst.";
- Provide a choice of possibilities, from which the local planning team may pick the most suited tactics or approaches;
- Connect the community's planners with experts and resources outside their borders. and

- Boost the competence and assurance of the regional planners in making important choices.

Validating the NRM plan

The NRM structure consists of the priorities, strategies, and action plans. Examine the structure to make sure the goal is reasonable and doable.

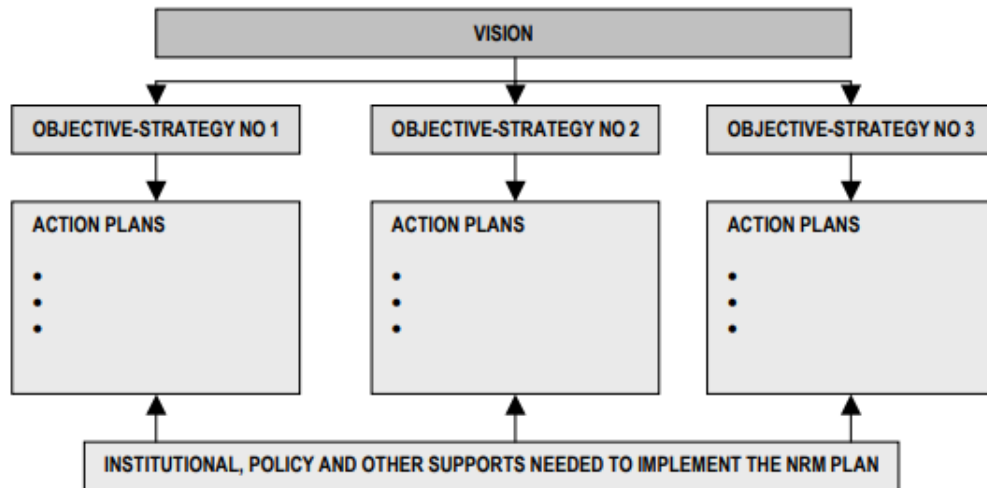


Figure 1. NRM plan framework

Major Scientific Topics of Interest in the Field of Mediterranean

To assess the development of specific fields of study within broad categories of the scientific literature on forest genetics in Mediterranean nations, we first built a network map of keyword co-occurrences throughout the full 30 year period using QUERY2. (1548 publications). For a keyword to be considered for inclusion, it must appear in at least 40 different publications. This is why we constructed a co-occurrence network using just 30 of the thesaurus's 29,458 terms (Fig. 2). The forest tree genetics community in Mediterranean nations has identified these concepts as the most pressing issues they face. In bibliometric analysis, a comparable amount of keywords is often utilized since it enhances map presentation without sacrificing important data. Table S1 of the Supplement provides data on the frequency of use of each term and cluster.

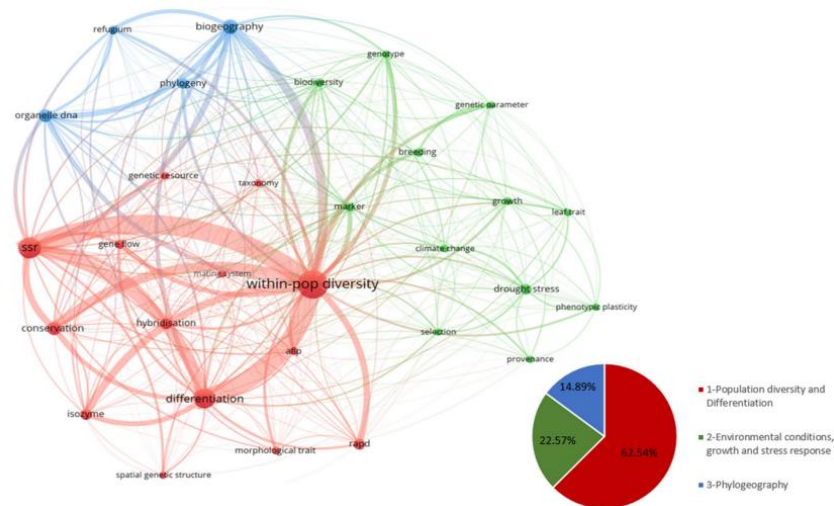


Fig. 2 Co-occurrence network of the 30 most frequent authors' keywords for the 30-year period.

Relative importance and topical closeness are expressed by the spacing between items. Same colored font is used for related keywords. Each keyword's font and circle size reflects the percentage of papers that include that keyword; The thickness of the line indicates the degree of association between the two words and the frequency with which they appear together. The proportion of total publications that may be attributed to each field is shown in a pie chart at the bottom right of the figure.

Cluster 1 (red) focuses on "Population diversity and Differentiation," accounting for over 62% of all publications in the field of forest genetics in Mediterranean countries; cluster 2 (green) focuses on "Environmental conditions, growth, and stress response," accounting for almost 23% of all publications; and cluster 3 (blue) focuses on "Phylogeography," accounting for almost 15% of all publications.

Hence, forest genetics research in Mediterranean nations focuses mostly on studying genetic diversity among populations and demographic differentiation. The terms "Withinpop diversity," "Differentiation," "Simple Sequence Repeats," and "Conservation" appeared most often inside this red cluster 1. As can be seen in Fig. 2, the word "Within-pop diversity" is centrally located, suggesting that it occurs often alongside phrases from the other two categories. Blue cluster 3 is concerned with studies of biogeography and phylogeny, although only four of the thirty terms are specific to those topics. However with an average of 55.13, they have the greatest citation rate, indicating that works produced in this field are highly regarded and serve as a cornerstone for the academic community.

CONCLUSION

The natural world, human communities, and economic systems all depend critically on water. For hundreds of years, people have made their homes around and on rivers, lakes, marshes, and deltas. Water provision, waste digestion, fisheries, energy generation, flood attenuation, spiritual, cultural, and recreational advantages, and the habitat for several ecosystems are just a few of the many functions that rivers offer. Since water serves so many purposes, it may be difficult to plan for its usage. Overabstraction, pollution, foreign invasion, alterations to floodplains, and loss of habitat are all consequences of human demands exceeding the capacity of rivers. Mistakes in judgment, inept leadership, and careless preparation are often to blame

for these flops. Sustainable river basin management begins with thorough basin design. Basin planning is a growing field that evolved in response to the shifting demands imposed on river systems by communities and the rivers themselves.

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