



Transforming Dryland Forests and Agrosilvopastoral Systems

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Dryland ecosystems cover vast expanses of our planet, facing unique challenges due to low precipitation and high temperatures. These arid and semi-arid regions are often overlooked, but they play a crucial role in global biodiversity and provide livelihoods for millions of people. Transforming dryland forests and agrosilvopastoral systems offers a promising avenue to address environmental degradation, promote sustainable agriculture, and mitigate the impacts of climate change. Dryland systems contain 44 percent of the world's agricultural land (58.4 percent of which is in Africa alone) and supply about 60 percent of the world's food production. Moreover, globally over 30 percent of urban areas and 34 percent of urban populations are found in dryland regions. Dryland forests and agrosilvopastoral systems make a significant contribution to the national economies of developing countries. Drylands contain 1.1 billion hectares of forest, or approximately 27 percent of the world's forest area. Dryland forests offer food, medicines, energy, fodder and fibre to local communities. Non-wood forest products enhance food diversity, contribute to nutrition and improve food security, particularly during periods of drought and other food crises. Healthy and productive landscapes are the basic building blocks for attaining better livelihoods, healthier diets and resilient economies, and this applies equally to those living in the drylands of the world. In Africa alone, dryland forests and other wooded lands are estimated to meet a large part of the needs of 320 million people. Future land use depends, in part, on the desired climate outcomes and the portfolio of response options available. As such, modelled pathways that limit warming to 1.5 °C or well below 2 °C require landbased mitigation and land use change, with most including different combinations of reforestation, afforestation, reduced deforestation and avoided degradation. Forests, often overlooked in discussions on environmental conservation, play a crucial role in maintaining ecological balance and supporting local livelihoods. In recent years, a transformative approach known as agrosilvopastoral system has emerged as a beacon of hope for arid and semi-arid regions, offering a sustainable solution that combines agriculture, forestry, and pastoralism.

Agrosilvopastoral systems integrate trees, crops, and livestock in a synergistic manner, promoting ecological resilience and sustainable land use. Unlike conventional monoculture or pastoralism, this approach harnesses the complementary relationships between different components to enhance overall productivity and environmental health. The article delves into the science behind agrosilvopastoral systems, explaining how trees provide shade, reduce water evaporation, and improve soil fertility

Challenge of Dryland Ecosystems

Dryland ecosystems, encompassing deserts, grasslands, and savannas, these areas are characterized by water scarcity, soil erosion, and vulnerability to climate extremes. Traditional agricultural practices in these regions often lead to deforestation, overgrazing, and unsustainable land use, exacerbating environmental degradation.

Importance of Dryland Forests

Dryland forests, though sparse, play a crucial role in maintaining ecological balance. They provide habitat for diverse flora and fauna, contribute to carbon sequestration, and act as a buffer against desertification. Moreover, these forests are integral to the livelihoods of local communities, offering resources like wood, non-timber forest products, and grazing land for livestock.

Role of Agrosilvopastoral Systems

To address the challenges of dryland ecosystems, a holistic and integrated approach is required. Agrosilvopastoral systems, which combine agriculture, silviculture (forestry), and animal husbandry, offer a sustainable solution. This approach aims to maximize the efficient use of land, water, and other resources, creating a harmonious coexistence between agriculture and forestry.

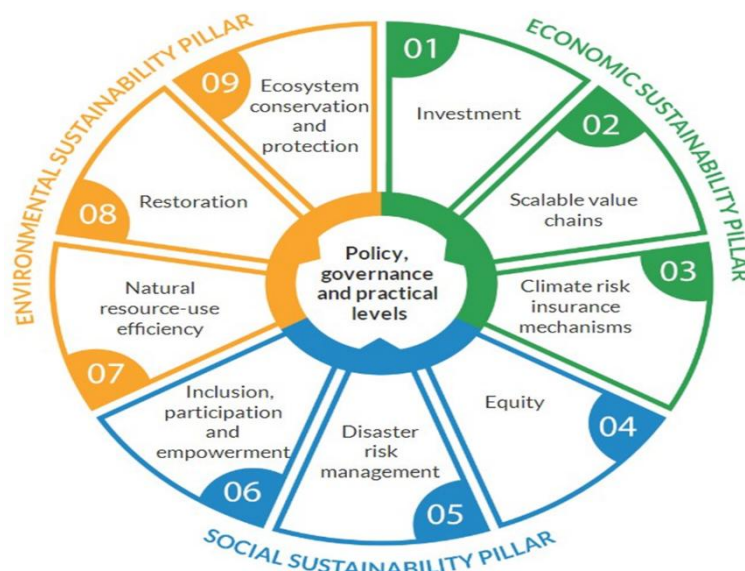
1. Sustainable Agriculture: In agrosilvopastoral systems, sustainable agriculture practices are implemented to enhance soil fertility and water conservation. Techniques such as contour plowing, agroforestry, and the use of drought-resistant crops contribute to improved crop yields. By integrating trees into the agricultural landscape, the system becomes more resilient to climate variability, reducing the risk of crop failure.

2. Silviculture for Ecosystem Restoration: Silviculture, the practice of cultivating and managing forests, is a key component of transforming dryland ecosystems. Reforestation and afforestation efforts help restore degraded lands, combat desertification, and increase biodiversity. Carefully selecting tree species that are adapted to arid conditions ensures successful establishment and survival, creating a sustainable and resilient forest cover.

3. Livestock Management: Agrosilvopastoral systems involve sustainable livestock management to prevent overgrazing and land degradation. Controlled grazing and rotational systems allow for the regeneration of grasslands and prevent the depletion of vegetation. Integrating livestock into the system ensures a diversified income for local communities and maintains the balance between agriculture and animal husbandry.

4. Community Engagement and Education: The success of transforming dryland ecosystems relies on the active involvement of local communities. Community engagement and education programs are essential to raise awareness about the importance of sustainable practices, conservation, and the long-term benefits of agrosilvopastoral systems. Empowering communities with knowledge and skills enables them to become stewards of their environment.

Transformational approach to sustainable management of dryland forest and agrosilvopastoral systems



Expected transformation 1 (Investment): Increased investment in sustainable dryland production systems and associated livelihoods through the collaboration of government, the private sector and others.

Expected transformation 2 (Scalable value chains): Scaled up sustainable dryland product value chains.

Expected transformation 3 (Climate risk insurance): Guaranteed equal and inclusive access to climate risk insurance mechanisms for dryland agrosilvopastoral system-dependent populations.

Expected transformation 4 (Equity): Improved social well-being and equity for dryland forests and agrosilvopastoral system-dependent livelihoods.

Expected transformation 5 (Disaster risk management): Protecting the lives and livelihoods of dryland agrosilvopastoral system-dependent populations against climate shocks, disasters and conflicts.

Expected transformation 6 (Inclusion, participation and empowerment): Participation and empowerment of dryland agrosilvopastoral system-dependent populations in all adaptation and mitigation decision-making and implementation processes.

Expected transformation 7 (Natural resource use efficiency): Efficient use of dryland natural resources to ensure the long-term provision of ecosystem services under climate change.

Expected transformation 8 (Restoration): Restored degraded ecosystems and halted deforestation to reduce the impacts of climate change on land degradation processes.

Expected transformation 9 (Ecosystem conservation and protection): Conserved and protected dryland ecosystems and biodiversity to maintain ecosystem services and the subsequent sustainable and equitable provision of ecosystem goods and services under climate change.

While agrosilvopastoral systems offer promising solutions, challenges such as policy barriers, knowledge gaps, and initial investment requirements need to be addressed. The article discusses potential strategies to overcome these obstacles and calls for collaborative efforts from governments, NGOs, and local communities. It also explores the potential for scaling up these initiatives on a global scale.

Benefits of Transformation

The transformation of dryland forests and agrisilvopastoral systems yields a myriad of benefits:

1. Environmental Resilience: The integration of trees enhances ecosystem resilience, mitigating the impact of climate change and reducing the vulnerability of dryland areas to desertification.

2. Biodiversity Conservation: Restoring and protecting dryland forests contribute to the preservation of unique flora and fauna adapted to arid conditions, fostering biodiversity.

3. Water Conservation: Sustainable practices in agrisilvopastoral systems lead to better water management, reducing soil erosion and improving water retention in the soil.

4. Carbon Sequestration: Forests play a crucial role in sequestering carbon dioxide, helping mitigate climate change. Agrisilvopastoral systems contribute to carbon sequestration by increasing forest cover.

5. Livelihood Improvement: By promoting sustainable agriculture and providing alternative sources of income through agroforestry and livestock management, agrisilvopastoral systems enhance the livelihoods of local communities.

Conclusion

Transforming dryland forests and agrisilvopastoral systems is a holistic approach that addresses the complex challenges faced by arid and semi-arid regions. By combining

sustainable agriculture, silviculture, and livestock management, we can create resilient ecosystems that benefit both the environment and local communities. As the global community grapples with the effects of climate change, investing in these transformative practices is not just an environmental imperative but also a path to building a more sustainable and equitable future for all.

References

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