

Editorial

Loss of Biodiversity – An Imminent Planetary ‘Heart-Attack’

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Biodiversity is the ‘beating heart’ of our planet¹. On land, trees are essential for biodiversity, creating numerous niches with a wide range of micro-environments - habitat for colonizing organisms both above- and below-ground [1]. This biodiversity in turn, is essential for sustainable ecological functions both in natural and artificial environments-including farmers’ fields [2]. Functioning agroecosystems are essential for the sustainable production of crops and so for the food security of many millions of farmers in the tropics and sub-tropics trying to feed and support their families on land that is becoming increasingly unproductive [3]. However, on-going deforestation and land degradation is continuing to escalate the losses in biodiversity and agroecological functions, as well as the decline of soil fertility. Thus, with the planet’s ‘beating heart’ under severe stress and the environmental health of our planet worsening, a crash comparable with a human heart attack is imminent.

The Patient

The biological resources of our world.

Diagnosis

The demand for farmland, especially in the tropics is driven by both population growth and agricultural policies which do not address the needs of smallholder households in the tropics and sub-tropics. This results in a downward spiralling ‘cycle of land degradation and social deprivation’ and in the rapid decline of crop yields [4] with knock-on negative impacts on soil fertility and agroecological functions [1]. In turn, this leads to renewed pressure to clear forests and woodlands for agriculture and consequently to further loss of biodiversity – exemplifying the demise of the ‘land sparing’ hypothesis. Such farm level ‘heart attacks’ are experienced when the crash of the agroecosystem creates a ‘yield gap’ that is so large that crops can no longer provide household food security. At the planetary level, however, widespread local heart failures occurring across numerous landscapes threaten species extinctions with dire consequences for the health of the planet - far in excess of a global food crisis. Indeed, there are further impacts of land degradation on the carbon and nitrogen cycles driving climate change with very serious consequences for the health of planetary functions.

Treatment

To rehabilitate and restore severely degraded land it is necessary

to reverse the cycle of land degradation and social deprivation. This depends on restoring the relationships between farmers, trees and biodiversity. A 3-step generic model has been developed, tried and tested to rebuild agroecosystem functions, to provide the livelihood needs of farmers and to generate new economic growth [4]. It is based on the social modification of indigenous trees that produce useful and marketable food and non-food products [2,5]. Some 50 of these new tree crops - the planned biodiversity - are then used to diversify cropping systems in ways that create niches for wildlife - the unplanned biodiversity - that improve food and nutritional security, as well as generating the income to meet the everyday needs of poor farmers [3]. This holistic approach is needed to address the complex set of interactions that lead to farm level ‘heart attacks’. Attempts to solve the loss of biodiversity without addressing the social and economic ailments of tropical agriculture, will not address the needs of farmers. Without addressing these needs by the widescale adoption of a holistic approach to reverse the cycle of land degradation and social deprivation (conforming to the ‘land sharing’ and ‘land maxing’ hypotheses – [5]) the threat of regional or even global ‘heart attacks’ will not be averted.

Recovery and Prognosis

The issues behind these problems for our world are complex and poorly understood by many decision makers, many of whom consider them to be the inevitable ‘trade-offs’ from agricultural intensification in a hungry world with a growing population [5,6]. However, all these opinions need to be challenged, especially in the light of new, much more farmer- and wildlife-friendly approaches to agriculture which offer opportunities to restore agroecological functions and mitigate climate change [1]; enhance local economies [3,5,6], and address the UN Sustainable Development Goals [2]. So, given the political will, prognosis for recovery and the aversion of a planetary ‘heart attack’ is good; but, currently, the ‘business as usual’ approach to agriculture prevails and threatens both ‘the patient’ and the planet.

1 = <https://news.mongabay.com/2018/01/trees-are-much-more-than-the-lungs-of-the-world-commentary/>

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