



Effective Ecological Restoration of Collapsed Ecosystems – Linking Soil, Water and Society

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All natural resources, utilized by humans are embedded in complex social-ecological systems (SE斯). To maintain the systems' sustainability, the SE斯 needs to be managed within their resilience optimum, considering both social and ecological elements. Throughout the centuries the humankind has often failed in doing so. Overexploitation of natural resources has thus widely disrupted equilibrium within the respective SE斯, driving unforeseen changes of ecosystems worldwide.

Anthropogenic factors such as poor institutional structure on resource utilization and weak policies in combination to environmental factors like droughts, fires or other unpredictable events have ruptured ecosystems' resilience and caused global degradation on a scale that currently threatens the Earth's welfare. As an example it's worth to mention that up to 40% of the world's agricultural land is severely degraded mainly due to unsustainable landuse. Once an ecosystem, or part/s of it, have collapsed, ecological restoration is almost always necessary to overcome the threshold/s that may prevent the system from self-recovering. It also re-activates the system's environmental cycles like the water, carbon and nutrient circulation. Although soil is the fundamental body of terrestrial ecosystems, water availability is of equal importance and should be taken more into consideration in restoration than currently is done. Based on that, we will focus on how to best manage effective large-scale ecological restoration (LSER) of collapsed ecosystems and link it to water catchment areas.

LSER is a fundamental social-ecological activity that substantially can improve ecosystem condition, human livelihood and if well organized, facilitate improved management of natural resources. By definition, restoration of ecological integrity and functions is the fundamental basis for all restoration activities. But to achieve long-term sustainability of LSER activities the initial set of rules/policies established by the stakeholders or the government must be congruent with local condition in context to regional, national and even global perspectives.

The related parties need to be in agreement to the content of the existing policies related to large-scale restoration and collectively work on achieving their targets. The actors must operate in line with the existing laws and legislation. Furthermore, all the multiple layers of the governance system need to cooperate internally in a transparent and decentralized way on attaining LSER targets; through for instance local restoration projects and improved land management. To assess if the policies are facilitating the expected LSER progress, a monitoring and evaluation system should also be in place.

Researches indicate that incoherency within the governance system and lack of social cohesion can significantly reduce the expected outcome of restoration projects. Here we will present an ecological restoration model based on a SE斯 framework that can be used to analyse the SE斯 the restoration activities will take place within. The model can also be used to organize restoration projects on different scales, to identify potential leverage points or gaps within the SE斯 and to design a tailor-made monitoring and evaluation program.