

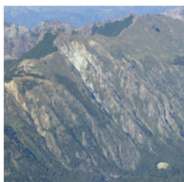


Ecosystem-based Disaster Risk Reduction

Radhika Murti

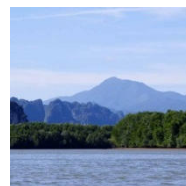
Director a.i. Global Ecosystem Management Programme

IUCN Headquarters Gland, Switzerland



**Protection Forests and
Avalanche modelling
Chile**

Swiss Snow and Avalanche
Research Institute



**Storm surges and Mangrove
Restoration
Thailand**

Mangrove Action Project



**Stabilising slopes with
vegetation for Landslides
China**

CIRAD - INRA



**Droughts, floods and salinization
using vegetation regeneration and
traditional practices**

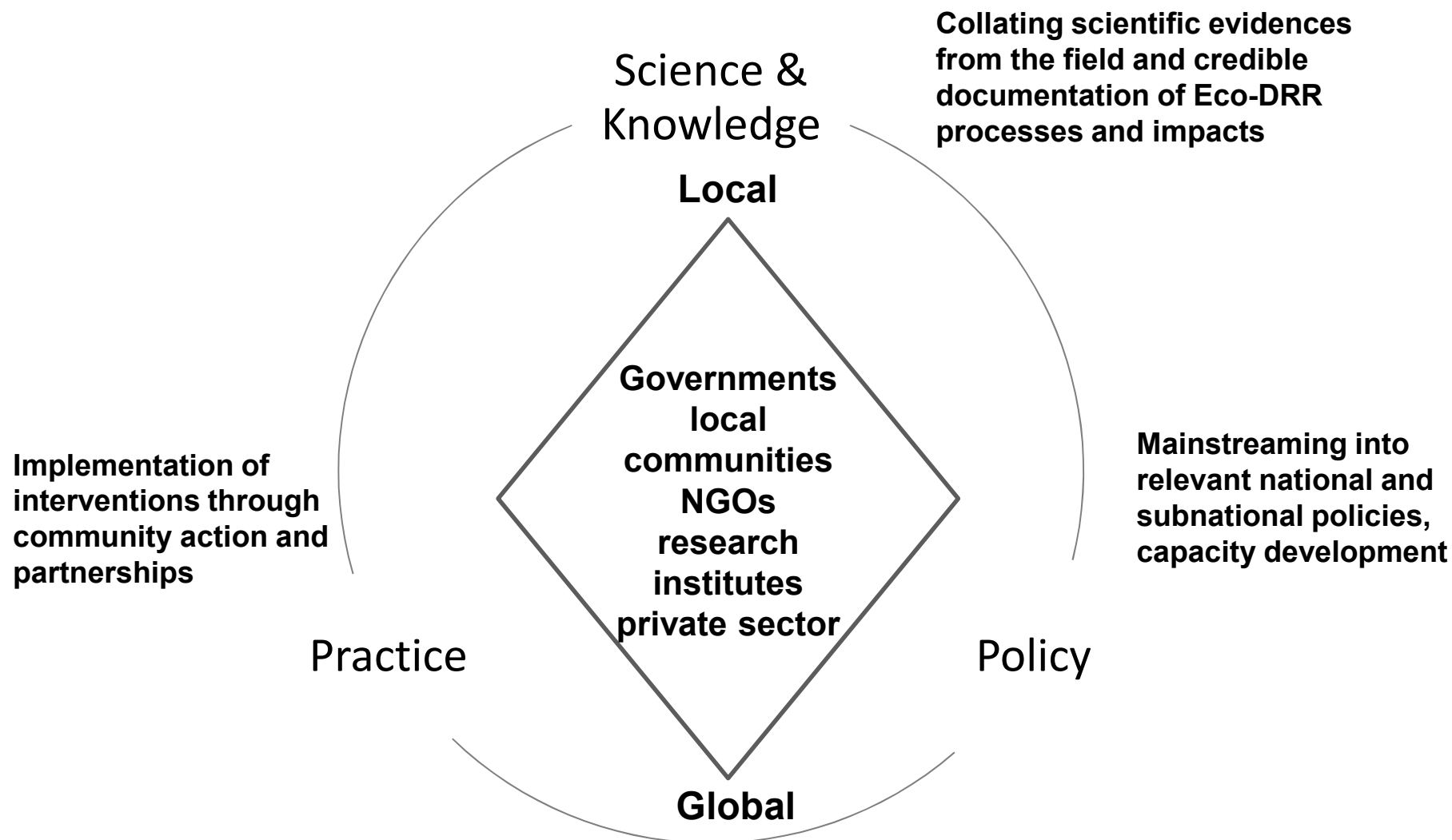
Burkina Faso & Senegal

Centre de Suivi Ecologique



**Restoration of slopes and
bioengineering for
landslide and sediment
runoff
Nepal**

University of Lausanne





Practice/Implementation



Community action for desalinization and floods (Burkina Faso)

Participatory
vulnerability



Identification of priority
disaster risks



Identification of local
solutions





Science, Knowledge, Advocacy

Participatory Research for Local Context



I. Penna (2013)

Example – Policy brief based on Nepal Research

Supported by:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

based on a decision of the German Bundestag

Ecosystems Protecting Infrastructure and Communities (EPIC)- NEPAL

Eco-safe roads through nature-based solutions:
soil bio-engineering, ecosystem management and community resilience

Policy Brief

October 2016

EPIC is a global Project involving six countries (Nepal, Chile, Thailand, Senegal, China and Burkina Faso). This project aims to demonstrate the multiple benefits and effectiveness of environmental management as a potentially important "Ecosystem-based Disaster Risk Reduction (Eco-DRR)" strategy in reducing climate risks and enhancing resilience of vulnerable communities especially through practical action. In the field, research by leading bio-engineering and risk analysis experts was combined with on-the ground livelihood strengthening activities in selected vulnerable communities based upon good practices from work on DRR and livelihood security. At the national level, IUCN worked with multiple stakeholders in advocating for greater considerations and investment in Eco-DRR activities, such as soil bio-engineering. This policy brief summarises key findings from the University of Lausanne (UNIL) research and suggests recommendations for greater mainstreaming of Eco-DRR, including greater uptake of the concept of "Eco-Safe Roads" in Nepal.

Project Duration: September 2012 to August 2017

Project Sites: Kaski, Parbat and Syangja Districts of Western Development Region, Nepal

Purpose

The main purpose of the project is to catalyse and quantify the role of ecosystems in protecting vulnerable communities against the risks associated with climate change and natural hazards. In Nepal, the project falls within the specific context of rural earthen roads, exacerbating erosion and landslide risk in the Panchase area.

Context

- Rural earthen roads or "unmanaged roads" are constructed by communities themselves without any design, drainage or grading and environmental considerations and are commonly wiped out during heavy monsoon rains.
- Such roads require costly clearing with heavy equipment and are a leading cause of erosion, shallow landslides economic losses to agriculture fields, and forests.
- Instead, low-cost and environmental friendly soil bio-engineering along roadsides or "eco-safe roads" using local resources (e.g. locally available deep rooted grasses and low cost civil engineering structures) can significantly reduce economic losses and environmental degradation.

Figure 1: Illustration from Syangja district showing new road which is reactivating old landslide, threatening over 100 households. Credit: I. Penna, UNIL.

Quick facts

- The number of rural earthen roads in Nepal has increased from around 200 km in 1998 to over 4000 km in 2013/14.
- In Phewa Lake watershed, there were 179 erosion events recorded along 129 km of rural roads, amounting to 1.5 erosion events recorded per kilometer of earthen roads or 70,133 m³ soil released in the watershed.
- In Tilahar village, the EPIC bio-engineering works reduced soil losses from 30 m³ in 2014 to less than 2 m³ in 2016.
- 125 community people trained by EPIC Nepal project
- 1.5% of all road budgets are earmarked for environmental protection (DOLIDAR policy) but seldom implemented.
- 1 million NPR is an average budget for 1 km of bio-engineering roads versus 5 kms of poorly designed roads in Middle Hills.
- More than half of allocated of road budgets in the Middle Hills area are used for clearing up rural roads after each monsoon season.

Results

1. Gather empirical evidence on the value of ecosystem based approaches to landslide and erosion reduction through three pilot sites

- Three soil-bioengineering pilot sites were established in Western Development Region of Nepal: Syangja, Kaski and Parbat districts to demonstrate the effectiveness of low cost community based roadside bio-engineering in collaboration with each District Soil Conservation Office (DSCO) (Figure 2). All three sites were designed, implemented and maintained in partnership with each community, using local knowledge of most appropriate plant species and techniques for low cost soil bio-engineering such as drainage and dry wall construction.

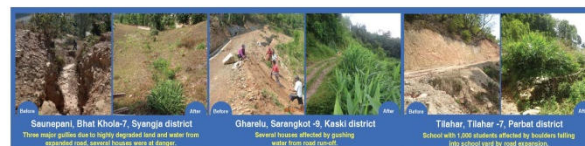


Figure 2: Three pilot sites in Syangja, Kaski and Parbat districts

- Two studies document the role of rural earthen roads in contributing to increased erosion and landslides
 - The first study completed in 2015 by UNIL documented over 179 erosion events along 129 km of roads surveyed (of 340 kms), amounting to an estimated 100 m³ of soil released to the watershed /km/year along earthen rural roadsides in Phewa Lake watershed.
 - A second study focused on land use changes in Phewa Lake watershed over 30 years documenting an increase in roads from 23 kms in 1979 to 340 kms in 2016. The study was on-going when an intense rainfall event (315 mm) occurred over 24 hours on July 28-29, 2015, killing nine persons in the study area due to a landslide. As a result of this event, UNIL documented 174 landslides (as compared to 14 landslides before the event), of which 68 landslides were situated either at the top or bottom of a road.

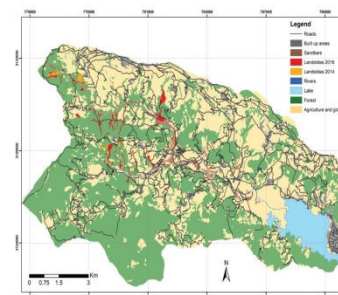


Figure 3: Phewa Lake Watershed study of land use changes 1979-2016 illustrates the 2016 road network and 174 landslides after July 29, 2015 rainfall event and the 14 landslides pre-existing landslides in 2014. Credit: M. Tonini and C. Vuillet, UNIL.

- Quantifying the role of vegetation in reducing erosion rates
 - Terrestrial LIDAR technology is a state of the art method for monitoring surface changes and vegetation growth. The three pilot sites were measured before any interventions were undertaken, then twice after the 2014 and 2015 monsoon seasons. Plantations were made in strips along the demonstration site roadside segments, with plants selected from the most common bio-engineering species, in consultation with each community.
 - Figure 4 illustrates the slopes in Tilahar village before the bio-engineering interventions were installed, where about 30 m³ of soil were lost during the monsoon season in 2014. In 2015, the slopes were modified with a toe wall and planted with four different types of species. Results in 2016 demonstrate that soil loss was reduced to 1.5 m³ after the 2015 monsoon season. (Fig. 5), or a 95% reduction in erosion at this site.

Zaï and Assisted natural regeneration



‘Fascines’ (Anti-salt bunds) and Gabions





Mainstreaming, Policy Advocacy



Parallel Efforts for Multiple Levels

- Global
 - Convention on Biological Diversity (2014)
 - Sendai Framework (2015)
 - Ramsar Convention (2015)
 - Paris Agreement (2015)
- Regional Mechanisms
 - UNISDR regional platforms
 - Inter-governmental processes
 - IUCN Regional conservation forum



National and sub-national

Country	Policy	Level
Chile	The revision process of the national territorial planning for biodiversity and conservation	National
	The national Plan for Adaptation to Climate Change in Biodiversity sector	National
	Integration of hazard maps that promote use of protection forests for avalanche and rockfalls into the regional and local land use planning, in progress.	Local/ BioBio Region
	Road management and planning	
Senegal	Established a commission in charge of prevention and disaster risk management in the department of Foundiougne (in August 2015)	Local/ Department of Foundiougne



National and sub-national

Country	Policy	Level
Nepal	Integration of eco-DRR into the new National Strategic Framework for Nature Conservation (NSFNC)	National
	In 2014, the Department of Soil Conservation and Watershed Management drafted the National Watershed Management Policy Act based on the Eco-DRR pilot, EPIC project	National
Thailand	Established Marine and Coastal Resources Management Promotion Act	National

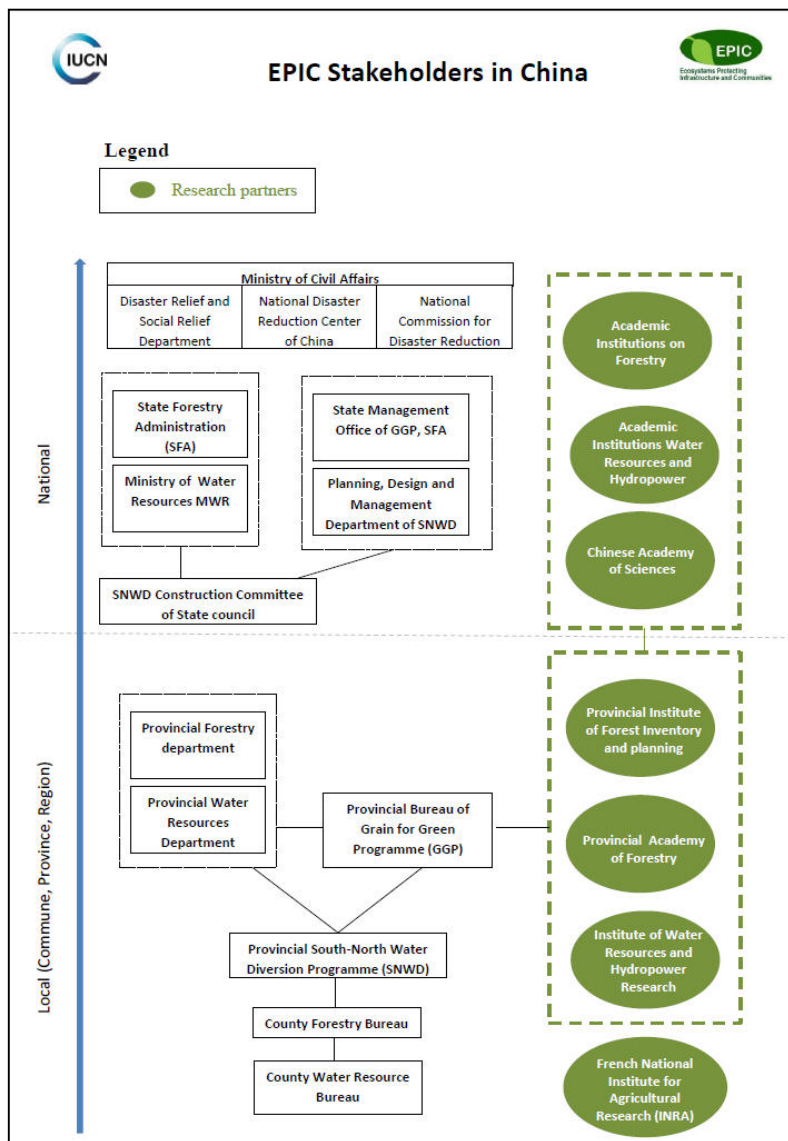


Lessons Learnt

- The need for capacity building, awareness raising and knowledge transfer – local to global levels, inter-ministerial, NGOs of DRR and conservation
- Actively bring together Ministries of Environment and DRR as they may not naturally interact with each other – building trust and establishing mutually beneficial opportunities
 - Territorial issues
 - Replicating rather than sharing mandates
 - Focus on hard infrastructure for which funding (even if loans) can easily be mobilised
- Use existing champions – IUCN focal points in Ministries of Environment
- Time, space and resources to convene across sectors and governance structures

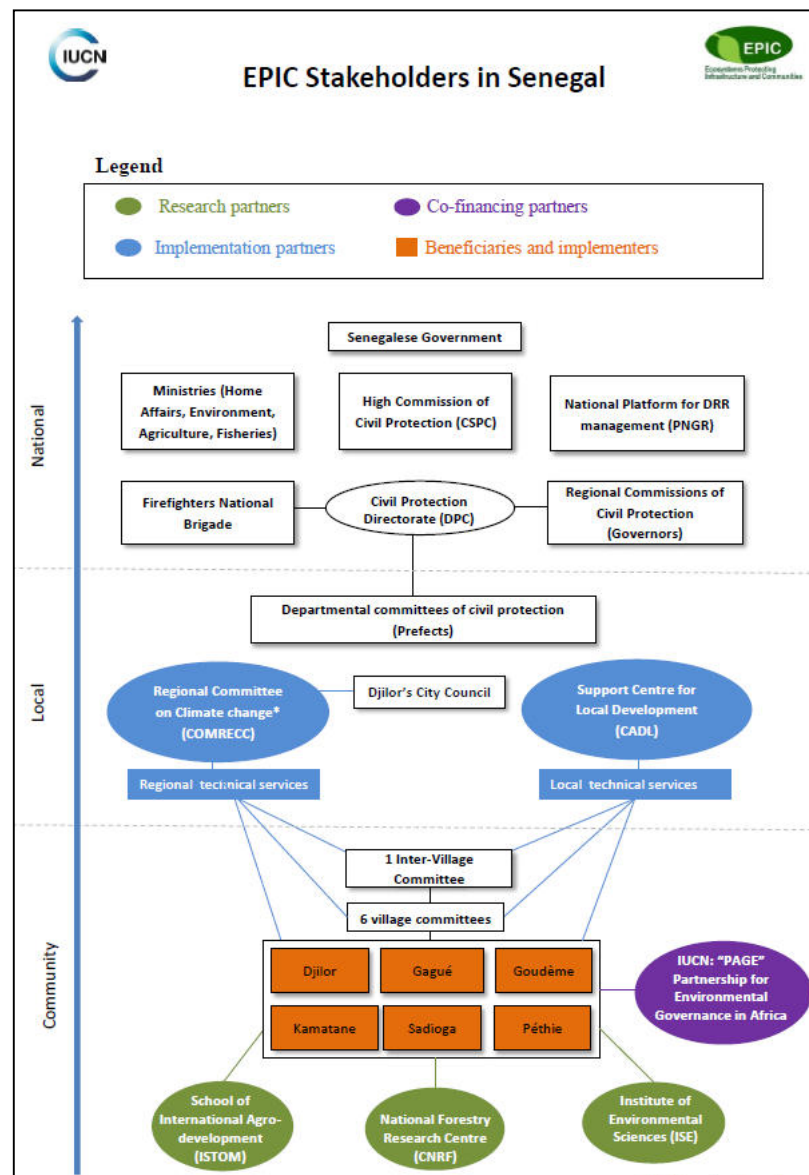


Multi-sectoral, multi-stakeholder, multiple levels!!





Multi-sectoral, multi-stakeholder, multiple levels!!





Lessons Learnt

- Strong national **and** sub-national policy engagement, otherwise challenging to scale up from pilot levels
 - Environment management can have a strong national focus (nationally assessed Redlist of Species, nationally designated Protected Areas) OR a very local approach – community based natural resource management
 - DRR can have multiple levels and especially sub-national, municipality, city/town council etc.,...levels which conservation has limited engagement with
- Climate change ≠ environment
 - Focus is on environment as a ‘problem’ due to CC, degradation, unsustainable development, species extinction, exploitation
 - Environment management is a solution



Lessons Learnt

- A more comprehensive approach to DRR
 - Involvement of relief/recovery stakeholders
 - Links with early warning systems, evacuation and preparedness training
 - Capacity development in using weather predictions to plan farming practices
- Improving understanding of coping versus adaptation mechanisms
 - Being able to differentiate coping from adapting (short/long) and values of both
 - Establishing appreciation of benefiting in the future



Gaps and Opportunities

- An Eco-DRR project design framework
 - Involvement of at least 2 Ministries
 - Conducting a social vulnerability and capacity assessment
 - Conducting an ecosystem risk assessment
 - Guidance to develop M & E
- An Eco-DRR Monitoring and Evaluation framework
 - Attribution versus contribution
 - Projected results in absence of an event
 - Projected results due to short project timeframes
 - Overall increased resilience of the local populations



Thank You
Merci

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Tedx talk Radhika/DRR -

<https://www.youtube.com/watch?v=AcHT6kJbVFM>