Tamera
Healing Biotope I

Report of Haiti visit

Goal of the visit
To identify ways to improve the provision of sustainable water and sanitation support to communities in urban and rural areas

Content

Introduction

This report will focus on possible solutions taking the example of the Carradeux camp as an all encompassing model. A short introduction of the principles of the Water Retention Landscape is given. Links to practical solutions and possible network partners are integrated in the text to condense it and to allow further reading.

Places and issues assessed during the Haiti visit

23.04.2013 Community of Mais Gate, Port au Prince (PAP)

- Sanitation (Latrines, Hygiene education)
- Rainwater Harvesting
- Waste management (Disposal and Recycling)
- Potable and usage water for households

24.04.2013 Community of Petionville, Bourge Champagne/ Belizaire, PAP

- Ravine restoration
- Small enterprise livelihood
- Waste
- Rainwater and Stormwater management
- New Settlements

25.04.2013 Jacmel/Marigot, PAP

- Flooding (annually, with extremes during hurricanes)
- Infrastructure damage & Resettlement for catastrophe prevention (bridges, roads, houses)
- Flood protection (Gabions, concrete)
- Insecure agriculture production due to regular floods
- Deforestation

26.04.2013 Carradeux camp, PAP

- Temporary shelters
- Community layout (self organisation and communal leadership)
- Social housing opportunities

Sustainable Water Management as the basis for rural and urban planning

Introduction to the principles of a Water Retention Landscape

Desertification, droughts and floods have a common reason: the damage of the hydrological balance by deforestation, industrial agriculture and sealed surfaces in urban areas. Naked soil becomes hot and looses the ability to absorb water. Rain erodes the topsoil. The earth body dries out, global groundwater reserves and fertility decrease. For food sovereignty we need a proper water balance.

A Water Retention Landscape is a model for natural and decentralized water management and restoration of damaged ecosystems. It is a basis for reforestation, horticulture and agriculture in regions threatened by desertification, and is part of a comprehensive model for sustainability on a large scale including water, food, energy and community building.

In short words the basic principle of the Water Retention Landscape is:

No rainwater should run over the earth surface but rather be infiltrated into the soil where it falls. Taking a certain territory into the focus the goal would be that no more rainwater and waste water leaves the territory but rather all water flowing away comes from springs.

If the aquifer is recharged water is available from springs and from wells in sufficient quantities for all human usage. In most cases the soil and the earth body is not capable to infiltrate the rainwater immediately. Therefore different methods are applied within the Water Retention Landscape to restore the Water balance. This includes: building of retention reservoirs (ponds, lakes), terraces, low proportion of sealed surfaces, road water infiltration, swales, permanent vegetation cover, mulching, adequate grazing management, afforestation…

If the principles are understood and integrated in the planning and management, water is available all through the year, erosion is stopped, landslides are avoided, vegetation is growing vigorous, rivers are constant flowing, floods are moderate, risk of fire is low, agricultural production is more secured…

Therefore we stress the importance of sustainable water management. In countries which have a low development of infrastructure there is a large potential to implement it in the right manner and not repeating the mistakes of the past and current management.

A detailed description of the Water Retention Landscape is published in the brochure “The secret of Water” by Bernd Walter Mueller:
http://www.tamera.org/fileadmin/PDF/WasserSymposium_en.pdf

Recommendations using Haiti and Carradeux camp as an example

In the camp of Carradeux in Port au Price 800 temporary shelters where build by AN AID ORGANISATION after the earthquake of 2010. The camp has a size of 18 ha and is divided in 14 neighbourhood communities. Roads and terraces/platforms have been constructed, light and electricity is partly available. On one border there is a riverbed (ravine). A church and small shops (food/water) are part of the camp. Some people still life in tent shelters.
AN AID ORGANISATION has developed a plan to convert the temporary shelters into permanent affordable buildings (social housing).
This could be a perfect situation to show on a small territory a comprehensive model for all the addressed issues in an urban setting. If initial funding is available and the rent for the houses is affordable, a new sustainable standard can be set in all areas of urban life. This model could find replication in municipal planning and private undertakings.

Recommendations of possible solutions to the issues

Water Management

Most of the households in Haiti have no access to a (municipal) water supply and sewage treatment. Drinking water and water for domestic use is purchased from local water suppliers using trucks and tanks. In dry periods most riverbeds are dried out and loaded with waste and sewage. In the rain season floods occur regularly with high risk of infrastructural damage.

Recommendations:
Rainwater from the roofs is collected and stored for domestic use, it can also be mineralised for drinking water quality. The runoff of roads and all other surfaces is managed with swales and channels, so that all this water is recharged into the local soil, earth body and aquifer. No rain– and sewage water is directly led into the ravine.
Rainwater that cannot be stored in the earth immediately (e.g. road runoff) is captured in retention spaces (ponds) which allow irrigation all over the year. If food production is a goal, ponds can be designed in a manner that allows growing fish.
As all rainwater is recharged to the aquifer, drinking water can be taken sustainably from wells or boreholes. Water can be disinfected using solar UV radiation.
We recommend communal laundry, kitchen and toilet areas with flowing solar heated water access. Communal infrastructure is affordable and allows combined sewage treatment and infiltration on the territory.
The floods occurring in the river/ravine can not be solved on the territory itself. But it is possible to show solutions without using concrete or gabions to divert and store the water for the dry seasons (see rural recommendations below).

Literature and consulting on rainwater harvesting: Brad Lancaster
www.harvestingrainwater.com
Professional training in creating Water Retention Landscapes in Tamera
http://www.tamera.org/index.php?id=916&L=0
Roof water for drinking usage
http://www.ieham.org/html/docs/Sistema_Captacao_Agua_Chuva_IPEC.pdf
Water disinfection by solar UV radiation using PET bottles (SODIS)
http://www.sodis.ch/methode/anwendung/index_EN

Energy

Most of the households in Haiti use charcoal or wood to cook their meals. The need for fuel wood leads to a permanent deforestation for charcoal production.
Using a combination of solar energy and biogas for cooking can substitute this need completely. Communal kitchens and restaurants can make very effective use of these technologies. Also on a family level there are small scale solutions available.
If the use of charcoal is still culturally necessary for special occasions the trees can be sustainably grown in rotation on the territory, especially if water is available and soil is recovering, due to the water management.
There are multiple sustainable ways of producing electrical energy which are not part of this report.

Biogas plant construction manual
http://www.tamera.org/fileadmin/PDF/biogas_digester.pdf
Biogas expert for urban areas and developing countries: T.H. Culhane
http://solarcities.blogspot.pt/
Scheffler reflectors and other low tech solar technology (cookers, dryers
http://www.solare-bruecke.org/index.php?lang=en
Scheffler reflectors build by Alec Gagneux, solar export for community kitchens in Haiti
http://solarcooking.wikia.com/wiki/Alec_Gagneux

Waste

For the disposal of household waste hardly any municipal logistic and infrastructure is available in Haiti. Therefore most of the waste ends in the ravines and is rushed into the sea.
Paper, plastic, glass and textile disposals can be collected and reused (up-cycled) or sold to the recycling market. Organic waste can be used for the production of biogas and/or for compost for gardens and trees.
If the waste is separated, used and recycled the rivers and it shores will be free of waste and can be used for bathing, sacred places and food production.

Sanitation

Hardly ever municipal wastewater infrastructure exists in Haiti. Either the wastewater ends in the rivers directly, or emptied latrines are disposed in yet unknown places.
Biogas plants and compost toilets can produce either gas or compost from human faeces.
Sewage treatments using septic tanks and reed beds can be another solution, generally involving higher costs, precise planning and running water access.

Eco-sanitation and recycling initiative for camps and settlements in Haiti and worldwide
http://www.givelove.org/
Compost toilet construction manual Tamera
http://www.tamera.org/fileadmin/PDF/SV_CompostToilet.pdf

Building

Wherever possible, sustainable local and natural materials should be used, being either affordable and/or contribution to the local economy. Buildings from earthen bricks have been proven very successful in tropical settings, also with regard to earthquake resistance.
Buildings made from straw bales are simple and cheap to construct if straw bales are available.
Roofing with wooden beams showed to be more earthquake resistant. Bamboo offers best building qualities and is locally grown.
Shading houses and outside areas with trees avoids the necessity of electrical air-conditioning. If additional air-conditioning is necessary water evaporation cooling systems can be applied.

Earthquake resistant earth block houses
http://www.earth-auroville.com/
Building and ecological restoration using bamboo in Haiti
http://www.icdf.org.tw/ct.asp?xItem=10731&ctNode=29819&mp=2

Food

Haiti is highly dependent on importing a large proportion of its foods. In cases of change, either in global economy or by catastrophes, Haiti is not able to survive without import.
Local food production is essential for the future of Haiti. Small household gardens using Permaculture principles bare the capacity of a high contribution to the national food production. Even in urban situations food can be grown, in front of the house, on the walls and on the roofs. Water Retention Landscapes combine infrastructure, water use and food production in a synergetic way.
Communal and household plots for gardening, as well as education gardens in the school, should be part of the urban planning and considered in each neighbourhood design.

Urban food autonomy example from Todmorden, GB
http://www.incredible-edible-todmorden.co.uk/
Small household food production example from Russia
http://thebovine.wordpress.com/2009/08/09/in-1999-35-million-small-family-plots-produced-90-of-russias-potatoes-77-of-vegetables-87-of-fruits-59-of-meat-49-of-milk-way-to-go-people/

Livelihood on site

A project of the size of Carradeux offers possibilities for local income generating activities.
Local food production allows local markets and processing (e.g. drying). The recommended methods and technologies are replicable and can be used for subsistence or marketed. Small enterprises can emerge in the fields of recycling, handcraft, restaurants…

Rural and landscape model

Floods in the lowlands are the result of a false land use management in higher elevations in the fields of agriculture, forestry and infrastructure. If water is retained in the higher elevations, soils and vegetation is recovering, the risk of catastrophes is highly reduced.
In the period of restoration, rainwater and river water is redirected from the ravines to retention spaces. The retained water allows indirect or direct irrigation and secures a large amount and variety of agriculture products. Potable and usage water for houses and farms are permanently available from sources, wells or ponds. The rivers flow through out the year with little variation of water level. In the lowlands infrastructure and agriculture is secured from flooding are landslides. Permanent flowing rivers allow irrigation and the recharge of the aquifer sustaining the availability for drinking water and avoiding salinisation in costal areas.

Proposal for long term engagement, models and sustainable water management

The proposal is to set up a model for a future settlement in one country where aid organisations and their partners have a continuous engagement.
This model should encompass all the successful components of the different works of aid organisations and its partner organisation. It should be placed in a community setting in cooperation with local partners. The sustainable management of water, soil and energy form the material foundation of this model.
The goal of the model is to showcase sustainable long-term solutions for settlements, both rural and urban and the livelihood of the inhabitants. The model is replicable and serves in addition as a training and education centre.
Water is the basis of life and essential to all human settlement and livelihood. There are simple, yet sophisticated ways, in the design of settlements. Ecological design allows sustainable access to clean water and healthy food. The knowledge is available but rarely implemented. Every new settlement, be it preliminary or permanent should recognize the aspect of water. Floods are avoided and the groundwater is recharged by harvesting all rainwater. The aspect of water is best regarded if all infrastructures are designed to serve the maximum for the restoration of water and soil. This includes houses, roads, paths, a master plan for the side that takes recognition of the larger watershed and the areas downstream. Water for irrigation and livestock can be directly harvested and used from the rain. Drinking water can be obtained from wells or springs.
All temporary camps can already include sustainable components, which will be replicated in the reconstruction process. Some shelters in Haiti already included rainwater harvesting and solar panels for electricity. If the camps are erected including the knowledge of sustainable water management and restoration of soils they can in the first year deliver water and food to the people.
Every catastrophe offers also opportunities, the opportunity for change. Most of the natural catastrophes and the consequences to humans are man made. Floods are the consequence of loss of vegetation and soil as a result of unsustainable land use practises. It is possible to reverse the mistakes and restore the environments and natural functions of ecosystems globally.

Large scale landscape restoration project in China documented by John D. Liu
http://eempc.org
Decentralized settlements: “Tamera A Model for the Future” by Leila Dregger
http://www.verlag-meiga.org/node/229

Education programs for sustainable and community based infrastructure and land use

Global Ecovillage Network (GEN)
http://gen.ecovillage.org/
http://www.gen-europe.org/
Ecovillage Design Education (EDE), UN endorsed
http://www.gaiaeducation.net/
Permaculture Design Certificate (PDC)
http://www.permaculture.org.uk/education
http://www.permacultureglobal.com/projects
Permaculture in Haiti
http://sadhanaforest.org/wp/category/projects/haiti/
Education and knowledge transfer on solar and water issues
http://www.barefootcollege.org/

Additional links

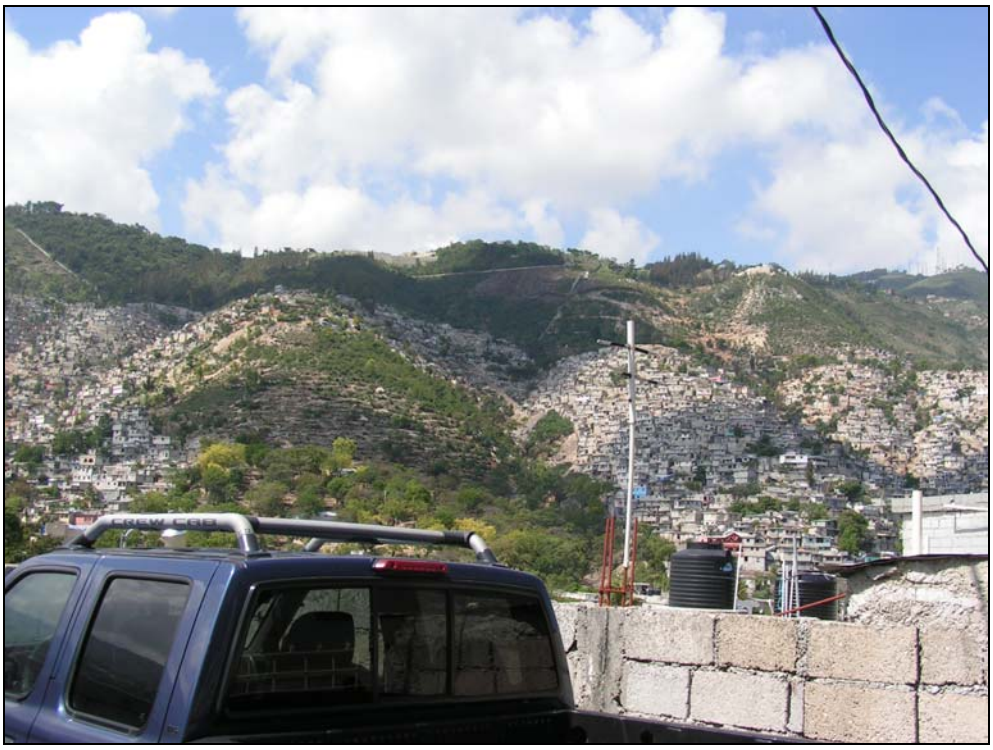
2. International Water Symposium Tamera
http://www.tamera.org/fileadmin/PDF/PDF2/Wassersymposium_en_Report.pdf
Third International Water Symposium, June 6th – 9th 2013 in Tamera
http://www.tamera.org/index.php?id=808&L=0
Solar dryers
http://www.solare-bruecke.org/Bauanleitungen/Tunneltrockner_en.pdf
Building and ecological restoration using bamboo in Haiti
http://www.sustainable-architecture.org/index.php/en/projects/casa-jacmel-haiti
http://haitireconstruction.ning.com/page/bamboo-stop-erosion-in-steep

Bernd Walter Mueller and Christoph Ulbig
Ecology Department Tamera
global.ecology@tamera.org

Photos

Issue: Waste deposal and accumulation in ravine
Recommendation: Recycling, composting and biogas give value to the waste; the ravine becomes a moderate river flow

Issue: Destroyed river embankment in same ravine (heavy seasonal flooding)
Recommendation: Water retention upstream, infiltration of water also in settlement areas, avoid total sealing of soils



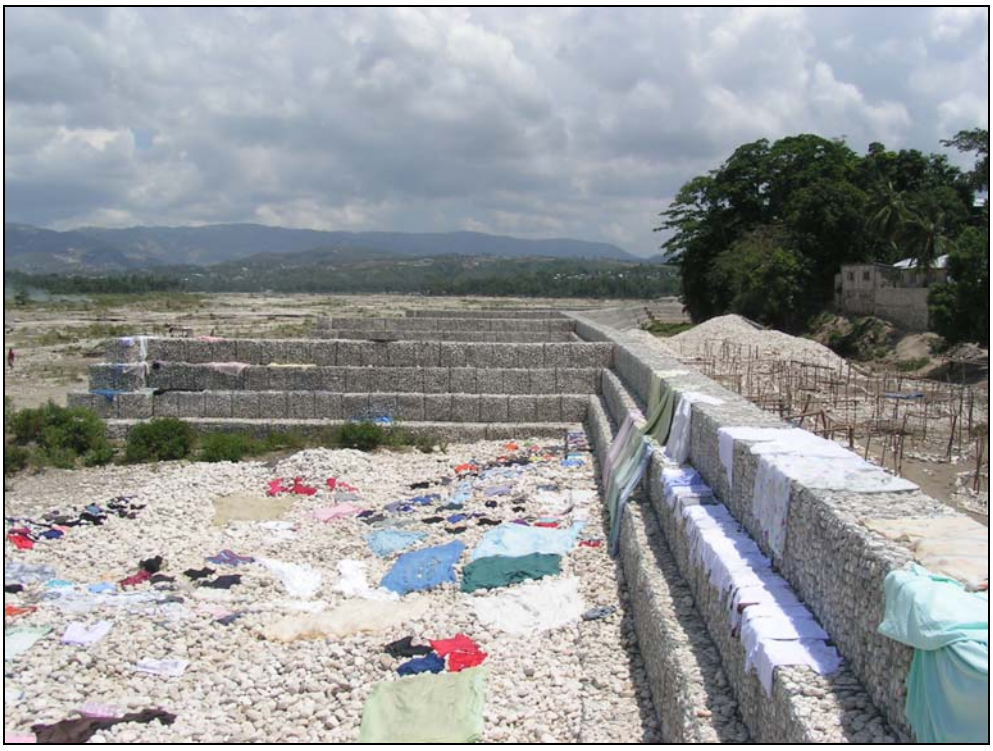
Issue: Land clearing, deforestation and surface sealing for building on slopes in PAP
Recommendation: Infiltrating the rainwater where it falls, so that it doesn't accumulate and floods downstream, Retention in ponds for irrigation on higher elevations, terracing and reforestation, ravine restoration,

Issue: New settlements on upper slopes without planning for water management
Integration of green areas for water infiltration within the settlements, contour line oriented planning, Ravine/Riverbed restoration, neighbourhood water management

Issue: Older settlements in PAP in new colours but dense with limited green zones
Recommendation: Rooftop gardening, neighbourhood garden plots, infiltration and usage of rainwater to a large degree

Issue: Deforestation, farming and grazing lead to low water holding capacity of soils
Recommendation: Contour swales, keyline application, agroforestry, forest strips, retention areas (ponds, lakes), permanent vegetation cover (low erosion), terracing, afforestation

Issue: Erosion and landslides resulting from grazing and deforestation
Recommendation: sustainable rotational grazing management, permanent vegetation cover, road and ravine management (store and infiltrate water instead of floods and erosion)



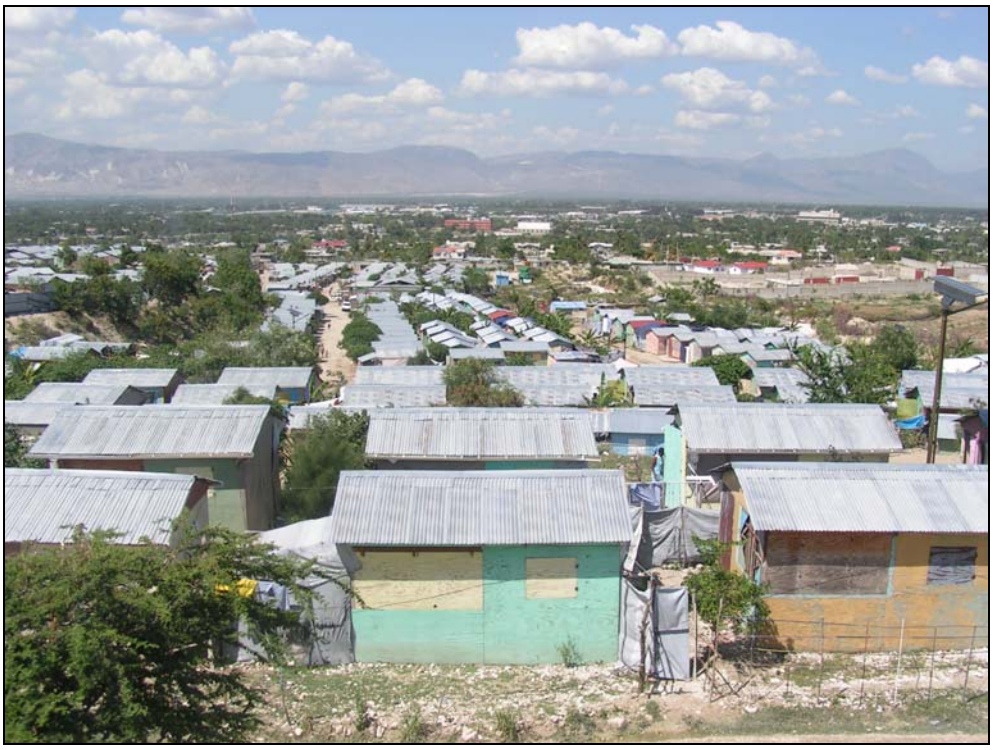
Issue: Flood protection using gabions in Jacmel
Recommendations: only upstream measures can solve the flood issue in the low lands, money that is invested in infrastructure reparation, or protection, even resettlement should be investee in land restoration upstream

Issue: Insecure livelihood situation, market near gabions will be flooded in rain season
Recommendation: Upstream solutions, permanent save market areas on higher elevation

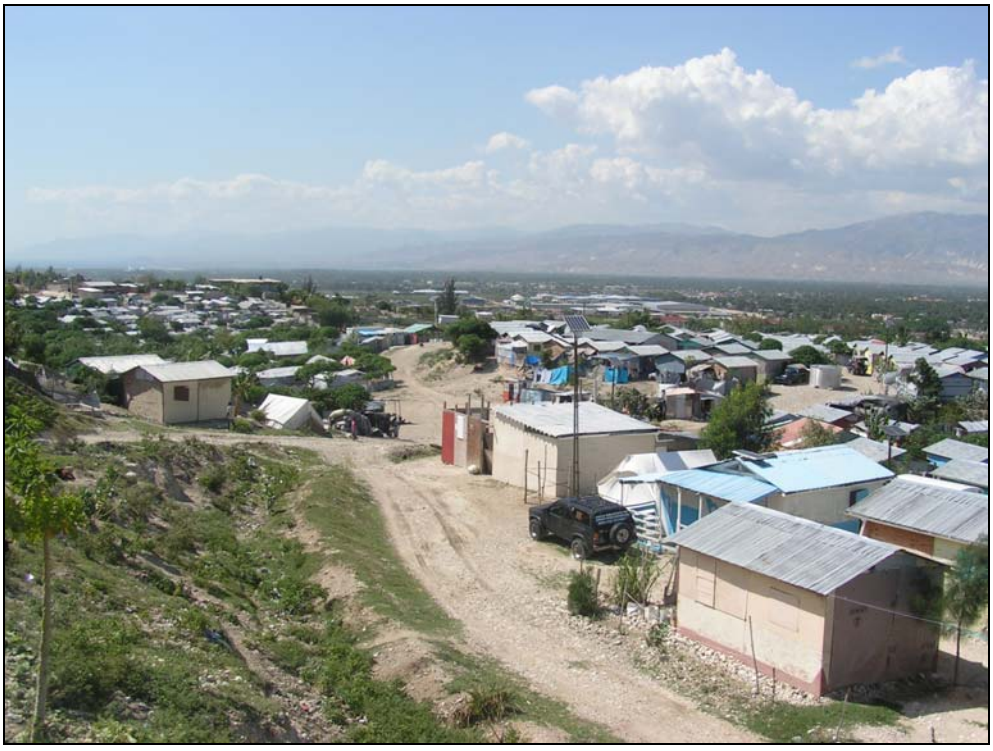
Issue: Destroyed check dams in riverbed near Jacmel (centre), deforestation (right)
Recommendation: Whole watershed management and appropriate techniques with regard to the amount of water, diversion of river waters using swales on contour, storage of water in pond and lakes for irrigation in dry season

Issue: Clearance of natural vegetation and permanent deforestation for charcoal
Recommendation: Picture shows potential for forest recovery, Integrate natural forest patches for water restoration, wildlife and biodiversity

Issue: Grazing and tree cutting result into dry landscape (front) steep slopes and natural regeneration result into vigorous and moist forest areas, river floods lead to landslides
Recommendation: Watershed management with stripes and mosaic of different land uses, use of rotation (grazing and farming) and permanent vegetation cover



Issue: Conversion of temporary shelters into permanent settlement (Carradeux PAP), Recommendation: Site specific water management and landscape planning for demonstration of social and sustainable housing in PAP



Issue: Infrastructure (roads, drainage) and water management
Recommendation: Watershed and contour oriented terrace and road design, retention of rainwater, zero runoff, ravine restoration