Supplementary Material: Co-production of adaptation services in the selected case studies

Case study: Lautaret, French Alps						
Adaptation service (AS)	**AS type**	**Ecosystem or land use**	**Key ecosystem elements**	**Type 1 co-production (ecosystem and landscape management)**	**Type 2 co-production (mobilization, harvesting, physical access)**	**Type 3 co-production (appropriation, social access, appreciation)**
Novel crops	Novel ES	Cropping (terraces)	Water, Soil, Biogeochemical cycling and biomass production, Sun	What: soil and crop management; collective parcel allocation; irrigation	What: production and harvest work and knowledge; collective equipment	What: Consume local products; transform and market local products
				Who: Farmers, various residents (part time)	Who: Farmers, various residents (part time)	Who: farmers, marketing and sales staff, tourists and inhabitants
				Human factors: full or part time labour. Knowledge on traditional or new climate- and market-adapted crops and on practises (e.g. greenhouses, irrigation)	Human factors: full or part time labour. Knowledge on harvesting techniques.	Human factors: knowledge on product preparation, packaging, communication and sales; preferences and values for local products, willingness to allocate money for local products
				Social factors: Access to real estate: collective land allocation - Solidarity and ability to work together. Access to parcels (tracks)	Social factors: Solidarity and ability to work together. Access to parcels (tracks)	Social factors: cooperative structure
				Manufactured factors: farming equipment (e.g. machinery, greenhouses, irrigation); technology and innovation for maintaining / upgrading terraces	Manufactured factors: farming equipment	Manufactured factors: transport vehicles (for sales to nearby ski resorts or towns), selling infrastructure incl. cooperative building within easy tourist access
				Financial factors: Direct income from sales. Financial support for new activities: loans, innovation incentives. Subsidies?	Financial factors: Financial support for new activities: loans, innovation incentives. Subsidies?	Financial factors: Supply chain and market (network), communication and marketing skills, support for cooperative selling structure, equity in payment options
Erosion control	Latent ES	mown terraces	soil physical properties, slope. plant root architectural traits, precipitation patterns (inc. extremes)	What: Maintain mown terraces; control stocking rate on grazed terraces	What: None	What: appreciate terraced slopes and reduced erosion (mudslide, water siltation) risk
				Who: Farmers, motivated / skilled inhabitants (?)	What: None	Who: farmers, residents, tourists
				Human factors: full or part time labour. Knowledge on mowing and grazing practises with traditional or new livestock species	Human factors: None	Human factors: values for traditional landscapes, communication
				Social factors: collective organisation of livestock farming, collective mowing (possibly innovative with inhabitants and/or tourists), solidarity and ability to work together. Attachment to mown terraces	Social factors: None	Social factors: None
				Manufactured factors: technology and innovation for mowing and for maintaining / rebuilding / upgrading terraces, access tracks to parcels	Manufactured factors: None	Manufactured factors: None
				Financial factors: Financial support from community. Subsidies, PES... Income from tourism	Financial factors: None	Financial factors: (avoided costs)
Resilience of fodder production	Persistent ES	mown terraces, P. paniculata grasslands	soil fertility, plant functional diversity (mown terraces), P. paniculata	What: Maintain mown terraces; manure fertilisation; collective parcel allocation; agri-environmental subsidies	What: Harvest by mowing	What: build stocks and stabilise farm income
				Who: farmers	Who: farmers, motivated inhabitants and possibly tourists	Who: farmers

			resistance to drought	Human factors: Labour, Knowledge and skills	Human factors: full or part time labour. Knowledge and skills on traditional and novel harvesting techniques.	Human factors: hay storing knowledge and skills; farm technical and financial management knowledge and skills
				Social factors: Collective terrace management, ensure equitable distribution of parcels across farmers, Attachment to mown terraces	Social factors: Solidarity and ability to work together. Access to parcels (tracks). Communication to tourists for participation in mowing	Social factors: collective hay conditioning and drying structures; solidarity across farmers
				Manufactured factors: Technology and innovation for fertilising and maintaining / upgrading terraces. Tracks for access to parcels	Manufactured factors: Technology and innovation for mowing. Tracks for access to parcels	Manufactured factors: hay drying and storing technology and innovation, barns
				Financial factors: Financial support for young farmers. Loans and/or collective funding for new equipment. Subsidies? Income from sales of agricultural products and from tourism	Financial factors: Financial support for young farmers. Loans and/or collective funding for new equipment. Subsidies? Income from sales of agricultural products and from tourism	Financial factors: Financial support for young farmers. Loans and/or collective funding for new equipment. Subsidies? Income from sales of agricultural products and from tourism
Shade for stock	Increased ES	grazed terraces, larch forest	deciduous trees / shrubs, larch	What: manage larch forest, plant trees on unmown terraces	What: include understory grazing in livestock management; predator protection	What: ??[co-benefit harvest wood and NTFP is NOT included here as a different AS]
				Who: farmers, tree planting / harvesting companies or individuals	Who: farmers, shepherds	Who: farmers
				Human factors: larch meadow and tree planting / management knowledge and skills	Human factors: grazing management knowledge; new knowledge for managing stock during hot weather; new knowledge and skills for predator protection	Human factors:
				Social factors: collective decision on tree planting location (parcel allocation), access tracks	Social factors: collective grazing management, collective predator strategies	Social factors:
				Manufactured factors: tree planting and management equipment, access tracks	Manufactured factors: fencing, shelter for shepherds	Manufactured factors:
				Financial factors: Subsidies, PES..., Income from sales of agricultural products and from tourism	Financial factors: subsidies for mountain farming, income from wood products and from NFTP	Financial factors:
Landscape connectivity	Transformation	P. paniculata grasslands	large, connected areas of P. paniculata grasslands	What: not intentional (co-benefit of historical mowing cessation).	What: None	What: None (Passive benefit)
				Who: -	Who: -	Who: -
				Human factors: -	Human factors: -	Human factors: -
				Social factors: -	Social factors: -	Social factors: -
				Manufactured factors: -	Manufactured factors: -	Manufactured factors: -
				Financial factors: -	Financial factors: -	Financial factors: -

Case study: Lake Faguibine, Mali						
Adaptation service (AS)	**AS type**	**Ecosystem or land use**	**Key ecosystem elements**	**Type 1 co-production (ecosystem and landscape management)**	**Type 2 co-production (mobilization, harvesting, physical access)**	**Type 3 co-production (appropriation, social access, appreciation)**
New forest products (charcoal, handicrafts)	Novel ES	New forests	Fertile soil in the former lake beds, colonized by invasive trees introduced in the surroundings of the former lake	What: No action (natural regeneration, not managed).	What: Harvesting wood	What: Transforming wood into charcoal or handicraft, transporting and selling them.
				Who: Nobody	Who: Women from the lowest social class	Who: Women
				Human factors: No knowledge or tradition of forest management (impeding management, which is needed to avoid that the forest become impenetrable)	Human factors: Workforce	Human factors: workforce, skills for product transformation
				Social factors: Unclear rights on forests (restricting management).	Social factors: No social restriction on forest harvesting by women of this social group. Unclear right on access and use (facilitating harvesting).	Social factors: Culture and taboo restricting the production of charcoal by women from higher social class (restricting the use of this AS for some people but not for others).
				Manufactured factors: -	Manufactured factors: -	Manufactured factors: Limited (perhaps cars or trucks for transportation to markets, although donkeys are more useful than trucks)
				Financial factors: -	Financial factors: -	Financial factors: -
Fodder production in the forested lake	Novel ES	New forests	Fertile soil in the former lake beds, colonized by grass and trees	What: None (natural regeneration, not managed). The lack of management is a risk because the forest becomes impenetrable to animals.	What: Letting small animals (goats, sheep) graze there.	What: Transforming, consuming and selling animal products.
				Who: Nobody	Who: Herders	Who: Everyone
				Human factors: No knowledge or tradition of forest management (impeding management)	Human factors: Limited workforce (time?). Herding skills	Human factors: workforce, skills for product transformation
				Social factors: Unclear rights on forests (restricting management).	Social factors: No social regulation of access	Social factors: traditions, social networks for marketing
				Manufactured factors: -	Manufactured factors:	Manufactured factors: -
				Financial factors: -	Financial factors:	Financial factors: -
Crop production in areas of Lake Faguibine where irrigation is still possible despite drastic environmental changes in the lake area	Sustained ES	Irrigated agricultural fields	Water availability in the Niger river and some part of the lake, soil fertility in the former lake beds,	What: Farming (preparing land, sowing, watering...)	What: Harvesting products	What: Transforming, consuming and selling agricultural products.
				Who: Farmers, mostly male.	Who: Farmers, mostly male.	Who: Farmers + their families
				Human factors: Workforce, farming skills, knowledge of farmers (who knew the good old times, persistent knowledge)	Human factors: Workforce, farming skill	Human factors: Workforce, transformation skills, marketing skills
				Social factors: Social networks to access land. Common desire to go back to the old times when the lake was full. Political promises to make the water come back (encouraging farmers)	Social factors: - (the important social factors are for access to land and are related to management)	Social factors: social networks for marketing
				Manufactured factors: Agricultural tools, Canals to bring water to the lake (a lot of engineering and maintenance in the past).	Manufactured factors: Agricultural tools	Manufactured factors: car/trucks in some cases
				Financial factors: Capital to buy inputs, need to pay for using lands	Financial factors: -	Financial factors: -
Fodder production in the grasslands around the lake	Persistent ES	Grasslands	Soil, grass, occasional rains	What: None (no real direct management, indirect management through decisions about where to graze: see "Mobilization")	What: Herding	What: Transforming, consuming and selling animal products.
				Who: -	Who: Herders	Who: Herders + their families
				Human factors: -	Human factors: Workforce, Herding skills, Knowledge about transhumance and fodder/water availability.	Human factors: Workforce, transformation skills, marketing skills

				Social factors: -	Social factors: Social networks, exchanges of information about pasture availability, Strong traditions of livestock breeding, Life style, Restrictions because of conflicts (wars) and policies (restrictions to transhumance)	Social factors: social networks for marketing
				Manufactured factors: -	Manufactured factors: -	Manufactured factors: car/trucks in some cases
				Financial factors: -	Financial factors: Little	Financial factors: -
Crop production around the lake when the lake was full	Decreasing ES (but could come back if the lake is refilled)	Irrigated agricultural fields	Water availability in the Niger river, soil fertility around the lake	What: Farming (preparing land, sowing, watering...) + Engineering works to maintain water levels in the lake.	What: Harvesting products	What: Transforming, consuming and selling agricultural products.
				Who: Farmers + Engineers, development projects, foreign aid	Who: Farmers, mostly male.	Who: Farmers + their families
				Human factors: Farming workforce and skills + Engineering workforce and knowledge	Human factors: Workforce, farming skill	Human factors: Workforce, transformation skills, marketing skills
				Social factors: Social networks to access land	Social factors: - (the important social factors are for access to land and are related to management)	Social factors: social networks for marketing
				Manufactured factors: Agricultural tools + Infrastructure & Machinery	Manufactured factors: Agricultural tools	Manufactured factors: car/trucks in some cases
				Financial factors: Capital to buy inputs and to access lands + Important external funding for water infrastructure	Financial factors: -	Financial factors: -
Fish production previously in the lake	Decreasing ES (but could come back if the lake is refilled)	Aquatic system	Lake, fish populations	What: No direct fish management but indirect management through engineering works to maintain water levels in the lake	What: Fishing	What: Transforming, consuming and selling fish
				Who: Engineers, development projects, foreign aid	Who: Fishermen	Who: Fishermen + their families
				Human factors: Workforce, engineering knowledge	Human factors: Workforce and skills	Human factors: Workforce, transformation skills, marketing skills
				Social factors: ?	Social factors: ?	Social factors: social networks for marketing
				Manufactured factors: Machinery, dams, canals, etc.	Manufactured factors: boat, fishing material	Manufactured factors: car/trucks in some cases
				Financial factors: Important external funding	Financial factors: for material	Financial factors: -

Case study: Kalimantan and Java, Indonesia						
Adaptation service (AS)	**AS type**	**Ecosystem or land use**	**Key ecosystem elements**	**Type 1 co-production (ecosystem and landscape management)**	**Type 2 co-production (mobilization, harvesting, physical access)**	**Type 3 co-production (appropriation, social access, appreciation)**
Water regulation, flood protection, in synergies with agricultural production resilient to floods	Sustained ES (human-modified ecosystems but same ES)	Forests and tree plantations	Vegetation and soils	What: planting and maintaining rubber trees, enforcing forest protection.	What: No mobilization need for flood protection. Mobilization for rubber harvesting (same as for other crop harvesting: not described here)	What: Appreciating safety and incomes.
				Who: farmers, villagers.	Who:	Who: Farmers and villagers.
				Human factors: workforce, skills, knowledge.	Human factors: -	Human factors: -
				Social factors: Strength of community rules. Social cohesion and interaction allow enforcement of rules that restrict logging.	Social factors: -	Social factors: Social learning
				Manufactured factors: Limited.	Manufactured factors: -	Manufactured factors: -
				Financial factors: Some to relocate houses and fields from flood-prone areas.	Financial factors: -	Financial factors: -
Water regulation	Sustained ES (human-modified ecosystems but same ES)	Natural regeneration and tree plantations	Vegetation and soils	What: Planting and maintaining trees	What: building and managing irrigation infrastructure (that helps farmers benefit from water regulation)	What: Using water for farming or consuming
				Who: Farmers, villagers.	Who: Farmers, villagers.	Who: Farmers, villagers.
				Human factors: workforce, skills, knowledge	Human factors: workforce, skills, knowledge	Human factors: knowledge
				Social factors: possibly collective work.	Social factors: collective work, cohesion	Social factors: sharing agreement
				Manufactured factors: tools	Manufactured factors: some	Manufactured factors:
				Financial factors: limited	Financial factors: some	Financial factors:

Case study: Andes, Peru						
Adaptation service (AS)	**AS type**	**Ecosystem or land use**	**Key ecosystem elements**	**Type 1 co-production (ecosystem and landscape management)**	**Type 2 co-production (mobilization, harvesting, physical access)**	**Type 3 co-production (appropriation, social access, appreciation)**
Water regulation	Persistent ES (by conserved or restored ecosystems). Sustained ES (by ecosystems transformed by management)	Wetlands, small ponds, grasslands with traditional aquifer recharge practices	Soil, topography, grass	What: Installing fences, building small reservoirs or canals.	What: Building and maintaining infrastructure to transport water to fields, rural settlements or cities	What: Using water for farming or consuming
				Who: Communities	Who: Communities, private sector	Who: Farmers, villagers.
				Human factors: Workforce, skills, knowledge	Human factors: Workforce, skills, knowledge	Human factors: knowledge
				Social factors: Cohesion (collective work)	Social factors: Water sharing agreements	Social factors: sharing agreement
				Manufactured factors: Limited.	Manufactured factors: Canals, pipes, etc. for water transportation and management	Manufactured factors: For some uses
				Financial factors: limited	Financial factors: Large investments	Financial factors: Fee payment (cities and large irrigated areas)
Fodder production	Persistent ES (by conserved or restored ecosystems). Sustained ES (by ecosystems transformed by management)	Grazed grasslands and wetlands	Soil fertility, grass, water	What: None (no real direct management, indirect management through decisions about where to graze)	What: Herding	What: Transforming, consuming and selling animal products.
				Who: -	Who: Community members	Who: Community members
				Human factors: -	Human factors: Workforce, Herding skills,	Human factors: Workforce, transformation skills, marketing skills
				Social factors: -	Social factors: Social networks, Access rules	Social factors: social networks for marketing
				Manufactured factors: -	Manufactured factors: -	Manufactured factors: car/trucks in some cases
				Financial factors: -	Financial factors: Little	Financial factors: -

Case study: Solomon Islands						
Adaptation service (AS)	**AS type**	**Ecosystem or land use**	**Key ecosystem elements**	**Type 1 co-production (ecosystem and landscape management)**	**Type 2 co-production (mobilization, harvesting, physical access)**	**Type 3 co-production (appropriation, social access, appreciation)**
New food production systems to improve food security	Novel ES (production systems that did not exist before detrimental effects of sea level rise)	Cropping and permaculture plantings in raised beds	Water, soil, biogeochemical cycling of organic matter, solar energy	What: building permaculture beds using coconut husks, compost and powdered limestone or coral	What: maintenance of beds, harvest produce, distribute food, replant beds	Consumption and trade of locally-grown food;
				Who: community & NGOs	Who: community	Who: growers & their families, recipients of traded food items
				Human factors: workforce - mostly women, transfer of skills & knowledge from NGOs to community	Human factors: women gardeners engage others & transfer knowledge	Human factors: knowledge of food storage
				Social factors: cohesion (collective work)	Social factors: community support & engagement in permaculture	Social factors: establishing rules for allocation from growers to other community members not involved in food production
				Manufactured factors: basic tools; initial requirement to source propagules of food plant varieties; building water supply - rainwater tanks	Manufactured factors: compost & organic matter to maintain beds; maintain & ensure reliable water supply	Manufactured factors: storage of root crops and preservation of perishable items
				Financial factors: aid from NGOs	Financial factors: community savings clubs, savings from not having to purchase imported food	Financial factors: establishing rules of trade and commensurate value for trade and barter
New land- and sea-based livelihoods	Novel ES (transformation of atoll drives migration to new islands & ecosystems). Sustained ES (where the same ES are used in new locations as on the atoll)	New land- and coast-scapes on other islands	Whole-of ecosystem	What: migrating to new islands, adopting new land & sea uses - development of new food production systems	What: acquisition of land & knowledge for smallholder farming & forestry; access to boats & equipment for fishing	What: developing rules and norms on land use and food production and development of markets and trading systems
				Who: community migrants from atoll	Who: migrant community	Who: migrant community & adoptive community
				Human factors: networks of migrants and existing Ontong Javan diaspora	Human factors: knowledge transfer from existing residents	Human factors: engagement with adoptive community
				Social factors: collective decisions on options for relocation	Social factors: co-learning by doing together	Social factors: use by migrants of existing local networks in adoptive community, as well as with expatriate network
				Manufactured factors: basic farming equipment, boats & fishing equipment	Manufactured factors: farming and fishing equipment	Manufactured factors: access to transport & communications
				Financial factors: support from government, NGOs, extended family, remittances	Financial factors: income from production, loans, NGO support	Financial factors: engagement in cash economy - for the first time for many people;

Case study: Murray-Darling Basin, Australia						
Adaptation service (AS)	**AS type**	**Ecosystem or land use**	**Key ecosystem elements**	**Type 1 co-production (ecosystem and landscape management)**	**Type 2 co-production (mobilization, harvesting, physical access)**	**Type 3 co-production (appropriation, social access, appreciation)**
New grazing systems: fodder from chenopod shrubland	Novel ES (transformation of riverine plains from myall woodland to chenopod shrubland)	Floodplain pastures	Plant functional diversity & response diversity to flood & drought; water availability	What: development of sustainable, low-input grazing systems on saline land, based on chenopod shrubs sustainable wool production and the emergence of a a sustainable wool industry and a high-value saltbush sheep and goat meat industry	What: application of knowledge on dietary requirements and tolerances of sheep & goats for chenopod shrubs; development of a system for finishing production of lambs on high protein cereals	What: establishment of markets for saltbush lamb and goat meat
				Who: graziers, extension officers, researchers, government agencies	Who: graziers, extension officers, researchers, government agencies	Who: graziers, wholesalers, market supply chain, customers
				Human factors: graziers developing knowledge by experimentation and practice of new wool and lamb production systems	Human factors: partnerships between graziers and animal production scientists; saltland farmer associations	Human factors: partnerships between graziers and animal production scientists
				Social factors: The Land, Water and Wool Sustainable Grazing on Saline Lands initiative: co-production of knowledge; learning by doing and sharing	Social factors: networks of graziers, field days, demonstration sites, websites, newsletters	Social factors: profitable, sustainable production systems benefit local & regional communities & economy
				Manufactured factors: landscape was transformed by clearing in 19th Century	Manufactured factors: farm fencing for holding & finishing paddocks	Manufactured factors: physical infrastructure that supports supply chains, e.g. local abattoir
				Financial factors: government grants, subsidies & incentives	Financial factors: government grants, subsidies & incentives	Financial factors: regional assistance grants, re-investment back into the community
Control of dryland salinity	Transformation from degraded saline land to productive pastures	Floodplain pastures	Soil properties, plant salt tolerances, water use and uptake, root architecture, perenniality	What: revegetating salt-affected land with saltland pasture species	What: appropriate design & planting with saltbush, native grasses, wheat grass & bluebush; surface water management	What: benefits of reduced saline water table at farm-scale and benefits for water and land management at catchment-to-regional scale from management of dryland salinity
				Who: graziers, government advisory staff	Who: graziers, revegetation contractors	Who: farmers, catchment managers, regional communities
				Human factors: knowledge on how to revegetate successfully - practical guidebooks, extension services; saltland farmer associations	Human factors: labour and expertise - knowledge and skills of landscape rehabilitation	Human factors: stakeholders and beneficiaries from improved surface water quality & rehabilitated, productive farmscapes
				Social factors: The Land, Water and Wool Sustainable Grazing on Saline Lands Initiative as a focal group for co-ordination of activities	Social factors: engagement of farmers & community groups in sharing knowledge about benefits of rehabilitating saline land, effectiveness & ongoing management	Social factors: rehabilitated landscapes promote social cohesion and community wellbeing
				Manufactured factors: revegetation seeder equipment, seedbanks, propagule supply	Manufactured factors: revegetation seeder equipment, seedbanks, propagule supply	Manufactured factors: None
				Financial factors: government grants and subsidies	Financial factors: farmer investment in revegetation; improved profitability	Financial factors: increased land value
Erosion control	Latent ES	Floodplain pastures	Soil physical properties; plant root architecture; intensity and frequency of rainfall and flooding	What: control of stocking rates & grazing on saltbush pastures though rotational grazing; manage and encourage regeneration of chenopod shrubs	What: experimentation with stocking and rotational grazing to determine optimal stocking rates that maintain healthy chenopod shrubland	What: production system is optimised and profitable without damage to underpinning resource base; runoff of soil to creeks and rivers is minimised
				Who: graziers, extension officers	Who: graziers	Who: graziers, catchment managers
				Human factors: knowledge on how to manage landscape to maintain natural erosion prevention afforded by vegetation community	Human factors: graziers share knowledge about optimal stocking rates to minimise erosion	Human factors: development of knowledge and expertise
				Social factors: Sustainable Grazing on Saline Lands Initiative as a focal group for co-ordination of activities	Social factors: networks of graziers, field days, demonstration sites, websites, newsletters etc.	Social factors: social networks for knowledge exchange

				Manufactured factors: technology and innovation for maintaining and managing chenopod shrubland & rehabilitation of degraded areas	Manufactured factors: machinery for remediating erosion and re-seeding saltbush on degraded land	Manufactured factors: networks for equipment exchange
				Financial factors: government grants, subsidies & incentives; investment by graziers	Financial factors: farmer investment in revegetation; subsidies, grants	Financial factors: avoided costs of loss of production and remediation
Management of water quality	Persistent ES (water quality declined following land clearing and salinity, but capacity for improved water quality has increased with ecosystem transformation to chenopod shrubland)	Floodplain pastures and riparian zones	Vegetation and soils	What: Maintenance of water quality for catchment and livestock health; fencing riparian zones, control of stock watering access	What: maintenance and restoration of riparian areas on farms, including seasonal grazing to optimise seasonal availability of fodder	What: benefits from improved water quality are realised from farm to river-basin scale
				Who: graziers	Who: graziers, contractors, Landcare groups	Who: graziers, catchment managers, communities
				Human factors: development by graziers of management plans for riparian grazing and water access	Human factors: planting and restoration of riparian zones by graziers and LandCare groups	Human factors: raised awareness of benefits of water quality as an AS and community capacity for management & maintenance of waterways and riparian zones
				Social factors: Sustainable Grazing on Saline Lands Initiative as a focal group for exchange of knowledge on riparian management	Social factors: networks of graziers and Landcare groups, demonstration sites, community activities	Social factors: social networks for knowledge exchange
				Manufactured factors: technology and innovation for managing riparian zones	Manufactured factors: fencing & related equipment	Manufactured factors: negligible
				Financial factors: government grants, subsidies & incentives; investment by graziers	Financial factors: farmer investment in riparian management; subsidies, grants	Financial factors: avoided costs in water treatment, siltation; in-kind value of volunteer labour

Case study: Ganges-Brahmaputra-Meghna Delta, Bangladesh						
Adaptation service (AS)	**AS type**	**Ecosystem or land use**	**Key ecosystem elements**	**Type 1 co-production (ecosystem and landscape management)**	**Type 2 co-production (mobilization, harvesting, physical access)**	**Type 3 co-production (appropriation, social access, appreciation)**
New production systems for food security	Transformation	Saltmarsh and coastal flats	Freshwater supply, salinity regulation, drainage, nutrient cycling & soil fertility	What: establishment of ditch-and-dyke permaculture and aquaculture system on barren land inland of mangrove forests	What: production of fruit trees & vegetables on dykes irrigated with rainwater from adjacent ditches used for fish production	What: benefits from improved food security and healthy, diverse diet; poverty alleviation
				Who: local communities, government officers, NGOs	Who: local communities, government officers	Who: local communities
				Human factors: community labour constructs dykes by excavating ditches	Human factors: families plant & maintain allocated land & ditch	Human factors: development of permaculture skills
				Social factors: autonomous family livelihoods & decision-making	Social factors: community support for program & active engagement in permaculture	Social factors: improved diversity of livelihoods & community wellbeing
				Manufactured factors: tree nurseries, seedbanks	Manufactured factors: trees and seeds distributed & planted	Manufactured factors: transport of produce to markets
				Financial factors: international aid agencies, national government grants	Financial factors: savings from having to purchase food	Financial factors: sale of produce; participation in cash economy
Coastal protection from erosion & inundation	Transformation	Newly accreted coastal flats	Water, soil, biogeochemical cycling of organic matter, solar energy	What: planting of newly-accreted mudflat with mangrove species	What: design and planting of multiple mangrove spp. with high response diversity to climate change & sea level rise	What: benefits to coastal communities from protection from storm surges and flooding; harvesting of mangroves for fuelwood
				Who: local communities, government officers, NGOs	Who: local communities, government officers	Who: local communities
				Human factors: volunteer labour	Human factors: volunteer labour	Human factors: local people recognise and appreciate the function of mangroves in reducing flood risk & storm damage
				Social factors: the Community Based Adaptation to Climate Change through Coastal Afforestation Program as a focal co-ordinating group	Social factors: engagement of communities in sharing knowledge about benefits of planting mangroves	Social factors: improved community livelihoods, food security and wellbeing
				Manufactured factors: mangrove nurseries	Manufactured factors: mangrove seedlings distributed & hand planted	Manufactured factors: None
				Financial factors: international aid agencies	Financial factors: international aid agencies, government departments	Financial factors: avoided costs of storm damage
Forest products from mangroves	Sustained or enhanced AS (ES of forest products from existing mangroves enhanced by new mangrove plantings	Newly accreted coastal flats	Water, soil, biogeochemical cycling of organic matter, solar energy	What: sustainable harvesting of mangrove for fuelwood, charcoal production	What: sustainable harvesting of mangrove timber, including pruning and coppicing	What: co-benefits of mangroves in providing forest products including honey, habitat for fish and shellfish spawning and harvesting sites for shellfish
				Who: local communities	Who: local communities, government officers	Who: local communities
				Human factors: volunteer labour	Human factors: volunteer labour	Human factors: local people appreciate co-benefits from mangroves in providing forest products
				Social factors: development and knowledge exchange of sustainable harvesting and management	Social factors: community engagement in harvesting fuelwood	Social factors: local people appreciate the benefits of mangroves in providing forest products that they trade and exchange
				Manufactured factors: negligible	Manufactured factors: charcoal burning	Manufactured factors: transport to markets in some cases
				Financial factors: negligible	Financial factors: income from forest products	Financial factors: avoided costs by sourcing fuelwood locally