African Centre for Technology Studies

*Harnessing Science, Technology and Innovation for Development*

June 2015

RESPONSIBLE NATURAL RESOURCE ECONOMY PROGRAMME ISSUE PAPER 004/2015

# A Circular Economy Approach to Agro-Biodiversity Conservation in the Souss Massa Region of Morocco: Project Case-Study

*Moha Haddouch*

Series Editors
Dr. Joël Houdet
Dr. Cosmas Ochieng

African Centre for Technology Studies (ACTS)
Responsible Natural Resource Economy Series no. 004/2015

*Series Editors*

**Dr. Joël Houdet**
*African Centre for Technology Studies (ACTS)*

**Dr. Cosmas Ochieng**
*African Centre for Technology Studies (ACTS)*

**Responsible Natural Resource Economy Issue Paper Series**

1. State of Environment Rapid Assessment (SoERA): Development of a Tool for Framing and Managing Urban Environmental and Social Challenges

2. Foreign Investment in Land and Corporate Social Responsibility: An Investigation for Africa

3. Balancing Extractive Activities and Biodiversity Conservation in the Congo Basin: Opportunities for Green Growth

4. A circular economy approach to agro-biodiversity conservation in the Souss Massa region of Morocco : Project case-study

# A Circular Economy Approach to Agro-biodiversity Conservation in the Souss Massa Region of Morocco: Project Case-study

Moha Haddouch
*Project National Coordinator, UNDP*

ACTS PRESS

2015

ACTS Special Issue Papers are circulated in order to stimulate or to inform policy debate on critical issues. They have been reviewed by the ACTS' Publication Review Committee. They represent the views of individual authors and do not necessarily reflect the views of ACTS.

Published in Kenya in 2015 by Acts Press,
P.O. Box 45917, 00100, Nairobi Kenya
United Nations Avenue, Gigiri Court 49
Tel: +254 20 712 68 94/95; +254 710 60 72 10
E-mail: info@acts-net.org
Website: www.acts-net.org

**Cataloguing-in-Publication Data**

A Circular Economy Approach to Agro-Biodiversity Conservation in the Souss Massa Region of Morocco: Project Case-Study/ Moha Haddouch.—Nairobi, Kenya :
Acts Press, 2015

(African Centre for Technology Studies (ACTS)
Responsible Natural Resource Economy Programme Issue Paper 004/2015)

**ISBN 9966-41-173-9**

# Table of Contents

# Abstract

The article discusses the prospects of the Argan (Argana spinosa) Biosphere reserve conservation under the scope of the 2012 National Charter for Environment and Sustainable Development. The rate of degradation of the Argan ecosystem and the unfair benefit sharing along the value chain of local products continues to threaten social well being of the rural populations that live within the Argan ecosystem. To address this disequilibrium, a project endorsed by the GEF and supervised by UNDP is being implemented by the Moroccan Ministry of Agriculture and Fishing. The project aims at introducing the circular economy approach through Payment for Ecosystem Services (PES), as a market based instrument, in order to conserve agro-biodiversity and promote local products in the Souss-Massa Drâa Region. Identified pillar products of local and global importance are Argan and honey. This paper discusses the opportunities and challenges related to the development of contractual agreements between the rights holders and end users of ecosystem services.

.

# 1. Introduction

Morocco is the 2nd largest biodiversity hotspot in the Mediterranean region with 31.000 flora and fauna species, its 9 million hectares of forests cover are what used to be once part of one of the world's most dense forests with emblematic species of worldwide importance such as Cedar (*Cedrus Atlanticus*) and Argan (*Argania Spinosa*). The country accounts for 5 ecosystems (forests and steppes, Saharans, marines and coastal, wetlands and caves), 930 endemic plant species, 17 biodiversity corridors, 10 national parks, 3 biosphere reserves and 24 RAMSAR sites. 70% of the country's surface water is produced in mountainous areas inhabited by 30% of the population (Bergigui, M.F. 2014).

To put some numbers on how Morocco is resources dependant, the agricultural added value driven from natural capital represented 19% of Morocco's GDP in 2013 (Haut Commisseriat au Plan, 2014), while food industry and phosphates accounted for more than 40% of the total exports in 2012 (MEF, 2013). However, the poverty and the vulnerability rates remain high: 14.4% and 23.6% respectively in rural areas (Haut Commisseriat au Plan, 2007).

To pave the way towards sustainable development in Morocco, there is a huge need to consider the feedback loop where the natural capital is contributing to economic wealth and national well being. Soil erosion, ground water depletion and pollution, illegal hunting and fishing, deforestation and habitat losses are the main drivers of environmental degradation (UNECE, 2014). Morocco's ecological footprint increased by 40% and went from 0.94 in 1961 to 1.32 in 2011, and the country is ranked 81st for the Environmental Performance Index (GFN, 2008).

Reversing the trend of environmental degradation by rebuilding natural capital is a new option of the Government. Actually, a project entitled: "A Circular Economy Approach to Agro-Biodiversity Conservation in the Souss-Massa Draa Region of Morocco" has recently been launched under the Regional MENARID program Integrated Nature Resources Management in the Middle East and North Africa Region. The project, endorsed by the GEF, in accordance with the UNDP procedures, is intended to strengthen the environmental pioneer programs of the Green Morocco Plan (UNDP morocco, 2014).

*The Green Morocco Plan*

The new agricultural strategy, Green Morocco Plan, established by the Ministry of Agriculture and Fishing, aims to consolidate the successes achieved and to meet new challenges facing Morocco's competitiveness, opening of markets and mitigating climate change impacts (MAPM ; 2010).

At the Souss Massa Draa region, Argan and honey value chains are placed at the forefront priorities of this plan as they are considered to be the main pillars for agro-biodiversity conservation. Therefore, their development is facing the global challenge that needs to be tackled by taking into account the roles of the ecosystem services as they are drawn in the Argan Biosphere Reserve Management Plan (DREFSO, 1999).

*The Argan Biosphere Reserve (ABR)*

The Argan ecosystem existed for millennia. Nature and humans managed to maintain a balance between exploitation and regeneration of natural resources. Today, sustainability is not an option anymore, and the Argan ecosystem is facing unprecedented challenges (UNESCO, 2008).

The Argan ecosystem contributes significantly to regional economics with provisioning services including the globally unique Argan oil, regulating services (soil erosion, air quality, climate and floods), supporting services (photosynthesis, nutrient recycling and pedogenesis), in addition to recreational and cultural services. A recent study concluded that Argan ecosystem contributed to the regional GDP by 6.6% (Benchekroun, F. 2014).

Government has certainly managed to overcome deadly obstacles and to support sustainability through the PCDA (Conservation and Development Project of the Argan tree), undertaken by the High Commission for Water, Forests and Combating Desertification (HCEFLCD) and the German Cooperation (GIZ). The joint efforts resulted in the UNESCO label as an Argan Biosphere Reserve (RBA) on December 8th, 1998, the first of its kind in Morocco (DREFSO, 1999).

However, with regard to current growth forecasts and development plans drawn to meet the population well being needs and the outlook for natural forest ecosystems remain bleak, leading to a tangible risk of rapid desertification that may render vast tracts of the Souss Massa Draa (SMD) region incompatible with human habitation (UNESCO; 2008) and urgent action is needed to prevent the loss of biodiversity and of critical ecosystem services (Bernecker, K. al, 2008).

To overcome this situation, the project's circular economy approach based on the introduction of PES was proposed to explore innovative market based conservative instruments of the ABR management plan.

# 2. Methodology

A literature review was conducted to shed light on the key decisive roles the PES schemes would play in implementing the Morocco Green Plan. This led to the introduction of a circular economy approach to agro-biodiversity conservation in the Argan biosphere reserve by integrating payments for ecosystem/ environmental services.

## 2.1 The circular economy approach

The ABR management plan efforts should converge towards Inclusive Green Growth goals, outlining a three-pronged strategy for pursuing a circular economy approach (World Bank, 2012):

Eco conception by Thinking in 'environmental systems':

Tailoring regional inclusive green growth strategies to the ABR management plan, with an emphasis on conservation, sustainable development and supporting issues;

Building resilience through agro-diversity preservation of the two pillar value chains: Argan oil and honey provisioning services,

Eco branding the ABR products.

**Meet up-front capital needs with innovative financing tools**:

Introducing PES and fair trade systems within the Argan and honey value chains;

Ensuring an equal value distribution by integrating natural capital and relevant taxation reforms into national accounting.

Promoting the social capital stock:

Structuring the sector and promoting a collective approach of communication.

Protection and promotion of human rights enhancement, mainly among poor and indigenous people in ecosystem provisioning areas.

## 2.2 The ecosystem service approach

The ecosystem service approach through PES to promote in situ agro-biodiversity conservation on private land represents a relatively recent trend in applied conservation. This approach targets conservation values through activities such as the protection of habitat for endangered species, ecological restoration or the aversion of habitat loss (i.e. "conservation performance payments"; Ferraro & Kiss, 2002).

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling (Millennium Ecosystem Assessment, 2005). They refer to conditions and ecological processes that sustain human well-being (Daily 1997; MEA, 2005). PES schemes represents an intuitive tool to periodically reward private landowners or communities, through annual cash or in-kind payments, for delivering additional conservation benefits (subject to a time-constrained agreement and strict conditionality). PES has been touted for their purported economic and ecological effectiveness, flexibility, and directness (Ferraro & Kiss, 2002; Wunder, 2005). However, research pertaining to their effectiveness in different contexts remains inadequate to draw generalized conclusions (Miteva et al., 2012).

In our specific project-case, an expert mission is planned for a period of six (6) months in order to identify the flow of ecosystem services, and to analyze their technical and economical characteristics, and to assess and identify payments for eco systems services that fit into each of the four pilot areas of the project. At least one system pilot per area will be identified taking into account the conservation and sustainable use conditions of agro biodiversity linked to Argan and honey sectors. Another mission for a period of five months will be assigned to provide an institutional and regulatory framework, a capacity building plan and a communication plan enabling the promotion of PES schemes. The following step of eight months period will mobilize technical assistance for the implementation of designed PES templates. As such, 120 M/day expert will be deployed for technical assistance on the ground. The last six months mission will allow to scale up the project's results at the national level and to draw up a national guide for the promotion of PES schemes.

## 2.3 Enabling Institutions and Regulations

The project's circular economy approach should be sustained by four basic pillars: Legal Framework, Institutions, Financing, and Good Governance.

*Legal framework*

During the last two decades, sustained political commitment for sustainable development and relevant policies are growingly consolidated both at the central and local levels. Articles 19, 31 and 71 of the 2011 Constitution stipulate that environmental protection is a joint obligation of the state and citizens; guarantee the right to a healthy environment as a basic right of citizens and consolidates public participation as a procedural requirement for a lasting development. The National Charter for the Environment and Sustainable Development consolidates the framework for the environmental liability regime with the establishment of a compensation mechanism for damage caused to the environment. The Law issued in 1999 and its 2002 decrees establishing compensation for deferred grazing in forest areas, including Argan trees, through a temporary and the voluntary surrender of rights by the legitimate users of such areas are the only legislative tools dedicated for PES schemes. Although the Moroccan legislation contains only one specific PES law, it does include numerous laws that use PES-like instruments.

The Law 11-03 on the Preservation and Valuation of the Environment is a framework law that established ground rules and general principles relating to the environment, including biodiversity. The precautionary principle has been introduced through the need for impact assessments and the compulsory compensation measures prior to obtaining authorization for economic activities (see Law 12-03 on Impact Assessment and its two executive decrees). The Water law 10/95 Act also established the basin agencies and based on the recognition of the economic value of water, enshrines the related principles of payment for the use and/or pollution of water resources. The Law 39-12 on organic production and the Law 25-06 on certification of quality provide detail standard specifications related to environment preservation. The Law 22-07 on Protected Areas redesigns the legal framework and provides guidelines for the involvement of local authorities, local communities and other concerned stakeholders in the management aspects. As for Law 13-09 on Renewable Energy it aims to promote energy production from renewable sources and allows access to market either by public or private entities. The Law permits also electricity to be produced and exported by private entities through the national electricity network. These legislative texts need however to be revised in order to take into account environmental externalities and to integrate PES regulations (Allali K, 2011).

Moreover, the property rights issues regarding assets which provide ecosystem services, the resources that benefit from the provision of ecosystem services, and the ecosystem services themselves have an influence on the design and implementation of the PES schemes. As a matter of fact, there are no direct recommendations for payments for the ecosystem service provided, given that the renewable resources and their services are owned by the nation initiatives. Instead, the assumed contracts would refer to actions by landholders to conserve or restore strategic areas for eco system services or regulation of the Argan ecosystem. At the Souss Massa region, contracts would be promoted with right holders, either individual or collective, while simultaneously initiating a process to help them to properly register their titles and consolidate their assets of ecosystem services. This process is considered important to achieve the project objectives.

*Institutions*

The analysis of the institutional framework should consider the role of public and private entities in PES transactions at both national and regional levels. The project will issue recommendations to improve their efficiency and suggest the actions required to promote PES initiatives in Morocco. The National Strategy for the Protection of the Environment and Sustainable Development, is

aiming to integrate environmental protection considerations into different socio-economic sectors, by broadening the scope from a natural resource protection focus to a more integrated ecosystem circular economy approach (urban, forest, agricultural, coastal, freshwater). The project will focus on the promotion of the cross-sectoral linkages which are essential to develop the necessary hybrid institutions and relationships required for effective PES, by the establishment and functioning of appropriate supervisory institutions to manage and enforce PES schemes. For this purpose, the Economic, Social and Environmental Council would be called to analyze the general decisions related to regional economy and sustainable development issues including an Environmental Services Payment Plan.

*Financing*

Local and national authorities could potentially help finance this regional Plan through the establishment of PES related taxes and subsidies. One possibility to be examined could be the opening of a specific PES sub-section of the Agricultural Development Fund (ADF), with the aim of supporting ecosystem services associated with agro biodiversity and water resources that support the Argan and honey value chains. Additionally, tax shift for the environment and the economy of the Argan sector has been claimed by the FIMARGAN inter-professional organization in order to promote exportation of eco labeled Argan oil.

*Good Governance*

PES schemes to be designed should ensure public participation through the Management Committees that will be created. This human resource mobilization within all public or private stakeholders will focus on those interested in contributing to the conservation and recovery of ecosystems. Potential representatives of these committees are:

- Local and regional government (Municipalities);
- National and regional Universities ;
- Ministry of Agriculture and fisheries;
- Ministry of Tourism
- Ministry of Environment
- High Commission for Water and Forests and Fighting against Desertification
- National Agency for the Development of the Oases and Argan Zones
- Water Basin Agency;
- Network of Associations of the Argan Biosphere Reserve;
- Inter-professional Federations of Argan and Honey

Clear communication channels should be established and maintained with all stakeholders throughout the duration of the project and their participation should be encouraged in the implementation, monitoring and evaluation of the proposed PES schemes.

## 2.4 Adopted approach to ecosystem services valuation

Valuing Ecosystems and Biodiversity as an opportunity for policy response, either at the national or at the regional level, is still at its first steps. Few studies have been initiated in sporadic areas and conclusive results are still missing.

Meta-analysis of valuation of ecosystems and biodiversity for the Argan forest has been recently conducted by the HCEFLCD (Benchekroun, 2014). According to preliminary outputs, Argan ecosystem consists of two main sections: the Fund which is the forest capital and the Production reflecting the value of forest goods and services. The changes in the first impact the sustainability of forest management, while the second is the value that should be taken into account in green Gross Domestic Production.

The evaluation method adopted includes quantification of all goods and services of the Argan tree ecosystem based on market value, direct revealed preference (replacement costs, lost productivity, cost from diseases, etc.) and benefits transfer methods.

Relevant data on Argan forest area, forest capital stock, net growth, age classes and species, production, farming systems came from various studies and available statistics. They are converted to 2010 values using the consumer prices index in Agadir (HCP, 2011).

Though available figures still need more accurate calculations, they indicate that there is a huge gap between the global benefits that the population receives from the Argan ecosystem and what the population is willing to pay for its conservation.

Efforts to synthesize knowledge should be triggered in remote areas through capacity strengthening especially in the regions of poverty where engagement of end-user groups is possible such as those who will enable Systems of Environmental Economics Accounting, support Green and Inclusive Wealth Accounting.

Moreover, awareness campaigns amongst decision makers of how significant are the economic values of ecosystems and biodiversity should be conducted in order to convince them to mainstream the natural capital into the regional development planning.

At the national level, a recent dynamic is being catalyzed following the Royal speech on the non-material capital.

Additionaly, a System of Environmental Economic Accounting (SEEA) has been officially adopted since February 2014, and the national statistics authority (or HCP) in Morocco is currently piloting 3 satellite accounts related to agriculture, forests and wastes.

A recent study, launched by UNEP in collaboration with the University of Minnesota, USA, and the Al Akhawayn University, Morocco, will attempt to Mainstream Ecosystem Services into sector and macroeconomic policies with focus on the economic tools to be used to implement actions in the context of Morocco (Pushpam K.; 2014). The SMD region is chosen as a pilot site of the project.

# 3. Overview of challenges and potential for PES schemes

The challenges facing the Argan biosphere reserve are three-fold:

- Underground water stock depletion due to excessive water pumping for modern agriculture;

- Overexploitation of forest resources including overgrazing and firewood trade;

- And rural household welfare impacted by the booming markets of the Argan oil.

The following sections discuss these challenges in more details, including stakeholder interests and the potential for PES schemes or alternative sources of ecosystem services to reduce or eliminate pressures on ecosystems.

Additionally, potential business companies and ecosystem services providers were identified as future PES contractors. Those would include tourism operators, local industry such as Argan factories, renewable energy companies, and large mechanized farmings.

## 3.1- Water-related Ecosystem Services

Over the last two decades, groundwater level descended by 10 m in the upper Souss basin and by 25 m at the downstream Ouled Teïma perimeter. The process is ongoing with an estimated decline of 2 to 3 m per year. Natural recharge of groundwater is becoming insufficient to meet increasing demand of modern expanding agriculture and an imminent risk of the aquifer system being invaded by marine water has also been flagged (UNDP Morocco, 2014). As a consequence, riots broke out in some intensive modern agriculture (Guerdane and Chtouka perimeters) and drew national government attention which took urgent measures in order to mitigate this ecological scarcity.

### *3.1.1 Guerdan water irrigation project*

The irrigation water supply project Sebt El Guerdane is a typical example of environmental service payment implemented in the framework of a public-private partnership (PPP). This approach is based on an exploitation concession mechanism called Build-Operate-Transfer (BOT) that was applied in the late 90s when farmers had begun to protest on the decline of underground water table that allowed irrigating some 10,000 hectares of citrus.

For this reason, the government authorities decided to built a giant pipe to convey water from the Aoulouz dam 90 km from the area threatened, and then appointed a group designated after a call for tenders for the construction of the structure whose first work began officially in October 2009. A consortium led by Omnium Nord-Africain (ONA), a Moroccan industrial conglomerate, won the 30-years concession. Other members included Morocco's Igrane Fund and Infrastructure Development and Management (Infra Man), an Austrian firm. By providing half the water needed by the citrus farmers, the Guerdane project reduced the risk of depleting underground water resources and safeguarded an agricultural industry and associated Argan forests which provide a living for an estimated population of 100,000.The government, being the collective water rights holder is also responsible to ensure water security. The demand/payment risk was mitigated by carrying out an initial subscription campaign whereby farmers paid an initial fee covering the average cost of on-farm connection. Beneficiaries, organized in a federation, express their willing to pay for incremental costs in order to preserve the upper basin forests. The idea of setting a fund that would be

supported by government subsidies is making surface, and suppliers will benefit from conservative activities convened with the federation. The concession, playing a role of intermediation, grants exclusivity to channel and distribute irrigation water in the perimeter while allocating operational, commercial, financial and environmental risks among the various stakeholders.

Preliminary results of the project highlighted the opportunity to sustain water provisioning services by introducing a PES scheme, strengthen private capacities to integrate ecosystem management into their businesses and raise funds in a Public Private Partnership (PPP). In conclusion, the approach of the El Guerdane PPP project confirms several advantages: i) It saves financial resources of the government that might serve for other environmental activities; ii) it allows to reap the benefits of investments both nationally and internationally (with their positive impact on employment and productivity); iii) and it allows access to a better quality of ecosystem service as part of a comprehensive environment sustainability (A.S. Gueddari, 2004).

### *3.1.2 Alternative sources of water: Desalination and Irrigation Project in the Chtouka area*

As surface water mobilization remains insufficient to mitigate water scarcity at the SMD region, the government is turning to the sea for alternatives and plans to build a desalination plant to provide water for irrigation in Chtouka, Agadir, Morocco's premium agricultural area where groundwater levels have dropped 40 m over the past 20 years. The Ministry of agriculture estimated the annual water deficit at 58 million $m^3$ (MAPM, 2011).

For this purpose, an agreement bill was reached for the establishment of a desalination plant. The Regional Council, the Wilaya of Souss Massa Draa, the regional Chamber of Agriculture, the Inter-professional Fruit and Vegetable Federation, the Regional Office for Agricultural Development and the Water Basin Agency signed the bill. Under this agreement, farmers will subscribe to a contract with the operator of desalinated water distribution network for a minimum quantity of 3,600 $m^3$ per hectare and per year. The final capacity of the unit, which is expected to cost 2.6 billion dirham, was set at 167,000 $m^3$ / day covering 13,600 ha. The provisioning services will be based on quotas in a way to ensure an effective use of both conventional irrigation water and the desalinized water according to water availability in the dam and the willingness to pay of farmers for treated water.

In other words, the environmental service consists of producing water pumped from the sea and treated in order to be used for agricultural purposes and to set standards for surface water use in a way to allow the aquifer replenishment, as well as allow small and medium farmers to practice traditional agriculture.

## 3.2 Energy-related ecosystem services

In 2008, Morocco launched the National Renewable Energy and Energy Efficiency Plan, one of the most ambitious renewable energy programs in the Middle East and North Africa region, expecting 42 % of its total energy mix to come from solar, wind and hydroelectric sources by 2020 (Zohra Ettaik , 2013). At the SMD region level, the Moroccan Agency for Solar Energy is currently implementing a 500 megawatts solar power complex, one of the African pioneers, located 20 kms east of Ouarzazate city. Despite these tremendous efforts, an environmentally sound energy balance is far from being reached at the regional level, as the excessive harvesting of firewood exacerbates the Argan ecosystem degradation.

Actually, 60% of the forests area are endangered due to desertification progress and the demand for wood products, especially firewood to meet the local population needs, is still high. Based on available data it has been estimated that 12-13 kg per day of firewood are collected per rural household, totaling 538.369 $m^3$ per year in the Argan forests surrounding Agadir and Tiznit cities. In addition, standard selective harvesting to rejuvenate the forests are not followed up by sufficient protection of forest stands while local populations are reluctant to enforce any protection measures that deny or limit the grazing of livestock (UNDP Morocco, 2014).

Investment in renewable energy along with the ongoing regulatory laws would offer the opportunity to reverse the current harvesting of firewood trend and help preserve forest biomass.

*3.2.1 Sustainably managing village groves*

In the framework of the GIZ project: "Promotion of renewable energies and energy efficiency for a sustainable development in Morocco", the creation of "village groves", was recommended through organizing collective local farms in logging operations within the UNESCO Argan Biosphere Reserve (IFAS and GIZ; 2010). The term "village groves" describes the forest areas used collectively, including areas under exploitation and protected areas. They serve to ensure the sustainable use of wood, and to protect other biotic and abiotic resources (GIZ; 2011).

The objective is to establish a stable economic plate-form based on income generation (e.g. fuelwood, fodder, Argan fruits). The conditions required for the technical and economic liabilities include the following:

- Defined contract for using forest land;
- Disposal of short-term loans for capacity strengthening;
- Subsidies for environmental measures such as the restoration of land and reforestation;
- Minimum sizes determined (e.g. at least 5 hectares for each forest protected area);
- Use of native tree species (Argan, Acacias, Moringa…)

Given that the Argan forest is an exclusive property of the State, village groves can be rented to small and medium enterprises for a period of time and be managed as a publically funded PES schemes.

3.2.2 Renewable Energy as an alternative to biomass overuse

For the majority of rural households and Argan oil plants in the region, energy needs are dominantly met by biomass fuels. Efficient alternatives like micro/pico hydropower, solar photovoltaic and improved ovens could significantly reverse this trend. A couple of small hydropower plants (45+18 KW) had been successfully established at the Ounaine Valley to deliver electricity to 9 villages in the framework of a development and cooperation agreement between Targa-aid NGO and the Swiss Confederation (Targa-aide et EPFL, 2005).

Donors contributed to investment, local users participates in financing the network and its maintenance, the National Office of Electricity and Potable Water (ONEE) is ensuring infrastructure standards and the interconnection within the network, national NGO's are facilitating the project

implementation. In addition, photovoltaic electricity is being developed by local research institutions as clean technologies in order to substitute the intensive firewood use in remote mountainous areas, providing zero emission solutions for the Argan oil eco-certified product plants (Ihlal A, 2015).

Excessive energy produced either through solar or hydropower assets could be exported to the grid according the new legislation enabling the promotion of Feed-in Tariffs incentives as alternatives to biomass use.

## 3.3 Biodiversity -related PES

### *3.3.1 PES Scheme for grazing set-asides*

The existing government supported compensation scheme for grazing set-asides in critical forest habitat is the first PES scheme legally designed to reward good forest stewardship by recognizing the economic value of the Argan services. The model links the strict conservation measures routinely enforced in set-aside areas under the HCEFLCD compensation scheme with a wide range of other sustainable management practices over much larger zones, either surrounding or in proximity of the set-aside areas.

For each individual PES scheme, these measures ensure the effective regeneration of Argan trees and the maintenance of related ecosystem services in core set-aside areas of 200-300 ha and in more extensively managed sustainable use zones covering a further 1,000-1,500 ha. The 1999 law and the 2002 decree compensate forest users for 350 MAD/ha (UNDP Morocco, 2014)

### *3.3.2 Bee pollination as an Ecosystem Service*

Honey bee pollination services are traditionally admitted to contribute substantial benefits to human populations and agriculture in particular. Saharian bees (Apis mellifera) provide the majority of these services to selective agriculture crops in the Souss area, like almonds, apples, avocado, citrus, cucumber, oignon, etc.

Today the SMD region counts about 99,433 hives. Spurge Honey, thyme honey and orange honey contributes to about 80 % of the total volume of honey production (DRA SMD, 2015).

However, the ongoing decline of wild bee colonies due to severe drought periods, insecticide applications in modern agriculture and the invasion of the black bee affected drastically this production during the last decades.

The proposed analysis of honeybee hive numbers and their transhumance circuits within the agricultural perimeters will indicate the importance of pollination services and the opportunity for PES schemes under local conditions.

## 3.4 Eco certification-related Ecosystem Services

The booming of the Argan oil industry catalyzed by the international market and the mechanization of the extraction process, led to an exceptional exploitation of every single Argan fruit.

Microeconomic analysis of a panel of detailed household data suggests that the boom has enabled rural households to improve food security and increase social benefits mainly education. Though households have become vigilant guardians of fruit on the tree, they show limited interests in the longer term tree and forest health (Travis J. et al; 2010).

More investigation into the dynamic interactions between Argan markets, local institutions, rural household welfare, and forest conservation is required. This would be critical to get a better understanding of the social dynamics within the Argan ecosystem, towards improving value chain power relations via a variety of tools, including the Protected Geographical Indication (PGI) of the Argan oil, Eco-branding ABR products and services and implementing export taxation reforms (UNDP Morocco, 2014).

### *3.4.1 Certifying Argan oil production*

The Argan value chain began to be structured from the 90s, with the creation of cooperatives and subsequently the Groups of Economic Interest and Unions. The FIMARGAN, an inter-professional confederation, has been created later on in 2011. In 2014, 245 cooperatives involving 6534 members most of them are women and not less than 600 private companies were transforming and exporting Argan oil (Ourais, 2011).

The PGI certification was attributed to the AMIGHA in June 2008. However the production of the Argan oil has remained fairly stable in recent years (4 000 tons per year) and formal exports represented only 10% of total production (El Allali, 2014).

The ongoing efforts aim at promoting the Argan oil PGI within the European union through eco branding and facilitating access to PGI for medium and small enterprises.

### *3.4.2 Certifying honey production*

Bee keepers are engaged in a dynamic organization through the creation of a regional association. The 2008 Law on Distinctive Origin and Quality Signs, aims to protect local products by enhancing a set of specifications within the stands of Euphorbia and thyme especially in areas of Ait Baamran and Agadir Idaoutanan (DRA SMD, 2015). Efforts are being conducted by professionals to recognize the PGI for surge honey and thym honey in their respective areas with full support of the project.

### *3.4.3 Certification for ecosystem services*

Certification for ecosystem services are defined in three different ways (Erik Meijaard and al, 2011):

1. Certification of PES schemes to demonstrate that they are ‘sustainable’ in terms of economic, social and environmental impacts;

2. Certification of PES schemes to demonstrate that they actually deliver ecosystem services from land use/management (i.e. verification of service delivery); and;

3. Certification that existing PES schemes or certification schemes e.g. carbon, timber etc. provide additional ecosystem services, other than what is being paid for e.g. watershed services from land-based carbon offset projects.

The project pretends to assist in the development a new system of eco-certification for the ABR through the identification of appropriate tools and measures to ensure the sustainability of local production systems. Hens, the second option that certifies PES schemes on the basis of the service delivered will be adopted in accordance with the UNESCO/MAB (Man and Biosphere) approach.

## 3.5 Cultural and natural related Ecosystem Services

### *3.5.1 Souss-Massa National Park (SMNP)*

The SMNP is one of Morocco's most significant national parks and bird reserves created in 1991 in recognition of its importance as a feeding ground for birds, including ospreys, marbled ducks, cormorants, greater flamingos, and the biggest attracting bald ibis. Tourism development is an ongoing threat to this breeding grounds, which remain off-limits. The ABR management plan aims to redevelop its natural balance, and test its participatory economic approach, using the SMNP, which is the main core area (FASSI D., 2011). The management of the park is under the HCEFLCD responsibility which delegates the maintenance of cultural and social activities to a local NGO. Access to visitors pays about 2 $US/visit. This PES like system can turn into an effective PES by an effective shared management of the park with local stakeholders and the tourist companies (PNSM, 2010).

### *3.5.2 Ecotourism PES model*

Tourism is one the main economic pillars in the region, beside agriculture and fisheries, as it is generating an estimated $ 635 million: 34.5% of tourism linked added value from hotels and catering in the country Morocco's seaside sector (CR-SMD; 2010).

Taghazout Bay, one of the projects inspired by the Azur Plan of the tourist vision 2020, is placing sustainable development at the heart of its priorities. The design of the resort takes into account the preservation of natural resources and respects the socio-cultural authenticity of the region. This area features a potentially high value tourism circuit linked to honey and traditional beekeeping including one of the largest traditional apiaries in the world (Taghazout Bay; 2014).

In order to promote this resort destination, the Moroccan Deposit and Management Fund (CDG) is willing to set up agro-tourism facilities that would promote real estate investments on one hand, and make local farmers aware of the potential economic opportunities which may be associated with agricultural practices related to tourism on the other hand (Allali, 2010). A hotel offer of more than 500 units will be developed as residences Estate Tourism Promotion (ETP), offering visitors the opportunity to stay on the beachfront or near the golf course as well to participate to the tourism circuits in remote rural areas. The opening of the first accommodation facilities and leisure was scheduled for late 2014, with the completion of the entire tourism component in 2017.

In accordance with these objectives, the concept of payment for ecosystem services provided along the Wadi Tamraghte Idaoutanan tourism circuit, embracing the Argan and honey road, has been defined and proposed in order to promote the estate tourist potential. The Project's big challenge is to develop a PES based partnership linking the local association (APATI), as provider of eco-cultural services, and CDG the beneficiary of these services.

# 4. Overview of potential market-based instruments and way forward

We have identified PES-like instruments for each group of ecosystem services (water, energy, biodiversity, eco certification and culture) in the previous section, highlighting the opportunities and challenges to their implementation. Table 1 summarizes and classifies them according to the category of market-based instrument (MBI) they belong to.

| Identified PES like schemes | Type of MBI | Evaluation criteria | Governance base | PES argument |
|---|---|---|---|---|
| - Ecotourism | Direct market | Cultural | Bilateral | Provision of economic incentives |
| - Village groves | Tradable permit | Environmental | Bilateral | Provision of economic incentives |
| - Bee pollination | Coasian-type agreement | Economic | Bilateral | Provision of economic incentives |
| - Souss-Massa National Park<br>- Grazing set-asides<br>- Photovoltaic and Renewable | Reverse auction | Environmental | Bilateral | Addressing the finding gap for conservation |
| - Irrigation | Regulatory price changes | Economic | Bilateral | Better resource allocation |
| -Eco-certification | Voluntary price signals | Economic | Market | Provision of economic incentives |

*Table 1: classification of potential PES-like instruments*

Yet, a lot work still needs to be done to ascertain the feasibility of their implementation. This will depend to a larger extent on the project's capacity to convince all key stakeholders that such tools can help them solve their problems. In that context, one must recognize that social and political tensions are more likely to be serious in situations with high transaction and / or opportunity costs (e.g. water) compared to those with moderate opportunity and / or transaction costs (eco-certification, energy and culture).

# Acknowledgement

I owe a great debt of gratitude to all colleagues for their comments and inputs to this work.

# References

Allali, K. (2011) *Services environnementaux, agrotourisme et réduction de la pauvreté*. ROA, INRA et FAO, Dossier spécial, n°2, Publications de l'ENA de Meknès, Morocco.

Benchekroun, F. (2014) *Evaluation économiques des services écosystémiques dans l'Arganraie*. Symposium act PNUE, Université Al Akhawayne and the University of Minnesota. Rabat.

Bergigui, M.F. (2014) *Analysing the role of the new constitution in enabling effective environment policy making.* UNITAR-Yale conference, UNDP Morocco.

Bernecker, K.and Bouja,M. (2008) *Rapport d´Evaluation Décennale (1998 –2008) de la Réserve de Biosphère de l´Arganeraie*. UNESCO, Rabat.

Costanza, R. (1997) *The value of the world's ecosystem services and natural capital*. Nature.

CR-SMD (2010) *Monographie de la région Souss Massa Draa. Union Régionale de la CGEM Souss Massa Draa*. Agadir.

Daily, G. C.(1997) *Nature's services*. Island Press, Washington, DC.

DRA SMD, (2015) *Cahier des charges du miel de thym dans la zone d'Idaoutanan, bibliothèque DRA*. Agadir.

DREFSO (1999) *Plan cadre de la Réserve de la Biosphère de l'Argan (RBA)* REF.SO/GTZ-PCDA, Rabat.

El Allali, H. (2014) *Projet d'Accès aux Marchés des Produits Agroalimentaires et de Terroir*. ONUDI, Rabat.

Erik Meijaard, Douglas Sheil, Manuel R. Guariguata, Robert Nasi, Terry Sunderland and Louis Putzel (2011) *Ecosystem services certification Opportunities and constraints*. CIFOR.

Ettaik, Z. (2013) *Renewable energy in Morocco: large scale deployment (MEM)*. Rabat.

Fassi, D. (2011) *Le pays de l'Arganier : Une école pour le développement durable National*. Oral communication for the Argan symposium; ANDZOA,Agadir.

Ferraro, P. J., & Kiss, A. (2002) *Direct payments to conserve biodiversity*. Science, 298(5599), 1718–1719.

GFN (2008) *Global Footprint Network*. UNDP, Rabat http://www.footprintnetwork.org/images/article_uploads/Morocco.pdf (accessed August 09, 2014).

GIZ (2010) *Etude sur les potentiels de biomasse pour la région Souss-Massa-Drâa et la province d'Essaouira*. Rabat.

GIZ (2011) *http://www.stoffstrom.org/en/references/international-projects/souss-massa-draa/*.

Gueddari, A. S. (2004) *Traditional approach to implementing a public/private partnership*. MAPM; Rabat.

Haut Commisseriat au Plan (2014) *Comptes Nationaux Provisoires 2013 (base 1998*). HCP ; Rabat.

Ihlal, A. (2015) *Fours solaires avec stockage de la chaleur pour la cuisson dans le monde rural*. Actes du séminaire « énergie renouvelables et Arganraie » ; UNESCO/ADEREE., Rabat.

IFAS and GIZ (2010) *Etude sur les potentiels de biomasse pour la région Souss-Massa-Drâa et la province d'Essaouira*. Agadir.

Lapeyre, R. et Pirard, R. (2013) *Payments for environmental services and market-based instruments: next of kin or false friends?* Working Paper N°14/13, IDDRI, Paris, France, 16 p.

MAPM (2010) *Projet Intégration du Changement Climatique dans la mise en oeuvre du Plan Maroc Vert «PICCPMV»*. ADA, Rabat.

MAPM (2011) *Projet d'irrigation de la zone de chtouka aït baha dans la region de souss-massa-draa; ORMVASM*. Agadir.

MEF (2013) *Tableau de bord des indicateurs macro- économiques*. Rabat.

Millennium Ecosystem Assessment (2005) *Ecosystems and Human Wellbeing: Synthesis*. Island Press, Washington DC,.

Miteva, D. A., Pattanayak, S. K., & Ferraro, P. J. (2012) *Evaluation of biodiversity policy instruments: what works and what doesn't?* Oxford Review of Economic Policy, 28(1), 69–92.

PNSM (2010) *http://www.lonelyplanet.com/morocco/souss-massa-national park#ixzz3TAZJHmeW*

Pushpam, K. (2014) *Mainstreaming Ecosystem Services into sector and macroeconomic policies and programs in Morocco*. Oral communication for the project start-up workshop. UNEP.

Taghazout Bay (2014) *http://www.taghazoutbay.ma/index.php/fr/offres-touristiques/presentation-de-l-offre-touristique*.

Targa et EPFL (2005) *Conférence Internationale sur l'Electrification Rurale – CIER*. Marrakech.

Travis J. et al. (2011) *How Have Booming Markets for Moroccan Argan Oil Impacted Rural Household Welfare and the Endemic Argan Forest.* Oral communication for the Argan symposium; AN-DZOA; Agadir.

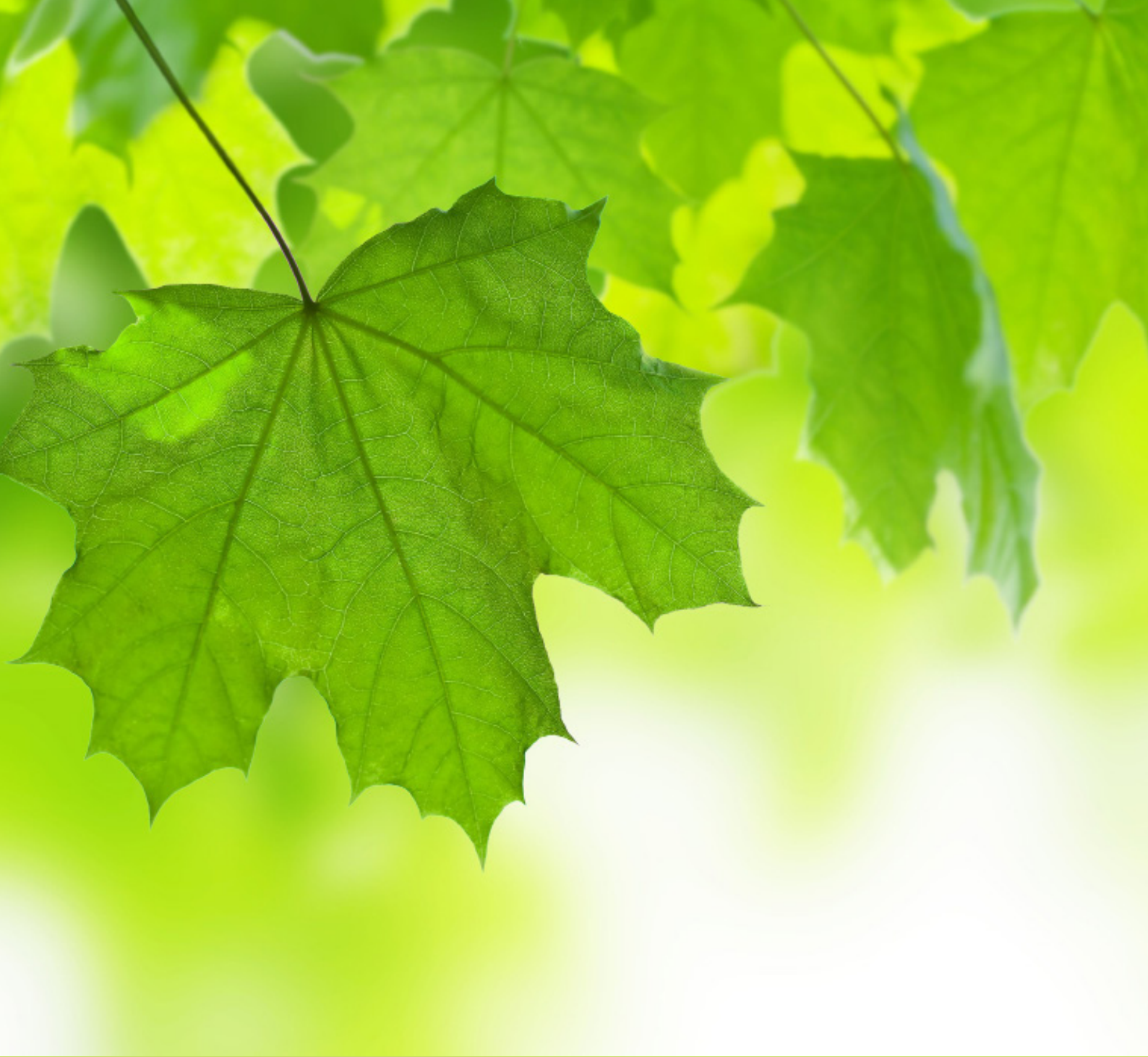
UNECE (2014) *Comission for Europe. Examen des performances environementales - Maroc*. New York and Geneva: United Nations.

UNEP (2014) *Ecosystems and human well-being - Synthesis." Millenuim Ecosystem Assessment*. 2005. http://www.unep.org/maweb/documents/document.356.aspx.pdf (accessed August 12,).

UNDP–Morocco (2013) *A Circular Economy Approach to Agro-Biodiversity Conservation in the Souss-Massa Draa Region of Morocco; Project document*. Rabat.

UNESCO (2008) *Rapport d'évaluation décennale de la réserve de biosphère Arganraie (1998 – 2008)*. Rabat.

World Bank (2012) *Inclusive Green Growth: The Pathway to Sustainable Development*. New York.



African Centre for Technology Studies (ACTS)
P.O. Box 45917, Nairobi, Kenya
Tel: (254-2)710 60 72 10
E-mail: info@acts-net.org
Website: www.acts-net.org
ISBN 9966-41-173-9