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News from African Protected Areas

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Invasive plants affecting Protected Areas of West Africa

Management for reduction of risk for Biodiversity

This study was conducted in 2012 for IUCN-PAPACO by Dr. Geoffrey Howard, coordinator of the IUCN Invasive Species Global Program (geoffrey.howard@iucn.org), who also provided the pictures. It aims to identify the risks of exposure to invasive plants from a sample of protected areas in West Africa, located in Burkina Faso and Ghana, and which cover from north to south a large sample of representative biotopes in the region see map on page 7). The first part of the study is summarized here, while issues relating to the prevention and control of invasions will be addressed in the next NAPA. All the results of this study are available on ***www.papaco.org.***

First part: context and introduction to invasive plant species…

Biological invasion

Biological invasion (in the context of this study) occurs when a non-native species is introduced to a new environment (ecosystem or habitat) and spreads causing damage – to native biodiversity that is being conserved. This requires that a species not represented in the vegetation of an area enters from "outside", survives to reproduce, spreads from its point of introduction, becomes naturalised and then spreads further – eventually causing damage.

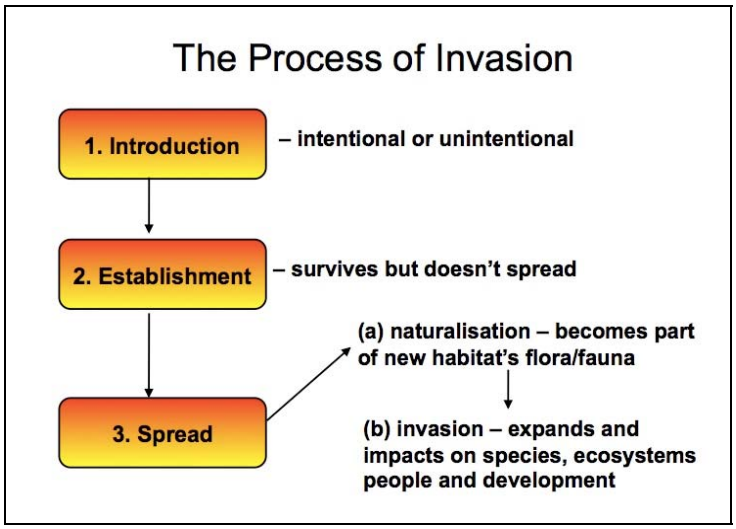


Diagram of the biological invasion process

The initial introduction may, in rare cases, be natural; but most often introduction is associated with people and can be intentional or unintentional (accidental). Most species introductions do not survive to the next stage of establishment. Those that do establish are able to reproduce and may stay where they were introduced – as harmless new arrivals. Some, however, will spread and "naturalise" which means they will establish in the local vegetation and may, with time, be considered as local species – but do not spread or cause harm. A small proportion of species may spread further and cause damage to the local biodiversity: these are the invaders.

This process and its steps from introduction to invasion may take weeks or months, sometimes years or even decades or centuries (as in the case of some species of trees). This is why we need to take note of new species that arrive (alien species) and

join the flora of a protected area – and check if they have a reputation of invasion elsewhere. This process is termed "biological invasion", the species becomes known as an "invasive species" or "invasive alien species" in this context (but not necessarily in other situations). In other words, a species should not be called an **invasive species** unless it is actually **causing problems** after going through the stages (above). Before going through those stages or in other places, it does not get the label of "invasive species". In the study, we are discussing alien species that have arrived in protected areas and which have become invasive (the "invasive plants") as well as those alien species that have arrived (or have been planted) in protected areas which have a history of invasion in other places – and so may become invasive in the future. This has happened in protected areas in some places, especially when alien trees have been planted for shade at entry gates and around staff houses and offices or as boundary markers along the edge of national parks, wildlife reserves and forest reserves. Such species may stay in a non-invasive state for decades (or even centuries) and then start to spread and cause damage both inside and outside the protected areas. This late delay is sometimes referred to as the "lag phase" of invasion and may be caused by a species' slow adaptation to new surrounds (sometimes involving the arrival of suitable pollinators) before viable and dispersable seed is produced in enough abundance to initiate spread and the next steps to biodiversity damage.

Invasive species can be animals, plants or micro-organisms (including agents of disease) but in the case of most protected areas in Mainland Africa it is the invasive plants that cause most damage to native species and to wild or production ecosystems. There are very few (if any) invasive mammals amongst the native fauna and flora in African PAs, and a few alien bird species that have become problematic – but none were detected as significant in this survey in West Africa. Invasive alien reptiles and amphibians are similarly scarce on the continent while there are several species of alien fish, intentionally introduced for food production, which are invasive in some cases. Free living invasive invertebrates as well as parasites and pathogenic organisms may occur but these require specialist expertise for almost every phylum and class. Among alien species, invasive plants have the most notable impacts on the biodiversity of African protected areas and so are the subjects of discussion here.

Abundant and characteristic old flower heads on Chromolaena odorata in Mole NP (Ghana). These are packed with many seeds that can be dispersed by wind, water and animals (as well as vehicles).

Impacts of biological invasion

The damage to native species or ecosystems by invasive alien species is usually the result of some characteristics of the invaders that allow them to compete with and dominate local species and alter habitats. Such characteristics include:

- Rapid growth rate which exceeds that of native plants,
- Great dispersal characteristics that quickly and widely disperse propagules[1],
- Large reproductive capacity, often producing large numbers of seeds or other propagules
- Broad environment tolerance, while native species often exist within narrow limits of temperature, rainfall, soil types, etc.,
- Effective competitor with local species – for water, nutrients, light and space to grow,
- Production of allelopathic substance (from leaves, stems or roots) which prevent other species from germinating, growing or reproducing to their full capacity.

The result of a plant invasion that employs one or more of these characteristics is the "damage done to biodiversity" and can result in decline or even local extinction of native species or habitats. Key food plants, nesting and shelter trees and shrubs for wild

[1] A plant **propagule** is a product of a plant that can initiate a new individual plant – such as a seed, a spore, tuber, corm, bulb, extension (ramet) or plant fragment that can grow under ideal circumstances. Propagules may be spread by wind, waterflows, tides, animals, people, vehicles and machinery.

animals, plants that purify waters and provide symbionts for others, those supporting climbers and sheltering delicate vegetation can also be compromised or even brought to extinction by invasive species. Ecosystems' stability, ecosystem goods and services and special habitats can be harmed in this way – affecting the very values for which a protected area was established. In some cases, such changes in vegetation and ecosystem function can enhance the chances and effects of wildfires and increase the damage done by storms and floods and droughts.

This, for protected area managers, is the **invasive species problem**.

Invasive Chromolaena odorata growing up and over tall vegetation in Mole NP (Ghana) in a small infestation in a relatively dense area of the reserve

Pathways of introduction and invasion

If one considers the ways in which alien species can enter native ecosystems in a protected area, it soon becomes apparent that they can be a significant threat which results in ecosystem degradation and loss of species. Alien species (that may become invasive) usually come into protected areas in two ways (although the total number of possible introduction pathways is many more than two): the first is accidental introduction to degraded or unoccupied areas where they can easily establish and then spread once a pioneer population has been established. Such areas as roads, road-sides, railways, aircraft landing strips, quarries, building sites, drains, streams and even formal park entries and parking areas can all bring propagules to sites where they can begin to establish plant populations in the absence of any competition. Over time these can enter the native vegetation systems and if they have one or several of the characteristics listed above, they can end up causing damage to native biodiversity as they begin to invade. This is, of course, a problem for protected area managers whose objective for management is "protection" of all species native to that area. It is worth noting that almost all of the sites of introduction are those places which are objects of other forms of management for a protected area – for access, transport, tourism, accommodation, research, etc.

The second common route of introduction of invasive plants is the intentional planting of alien species for production forestry, boundary marking, shade, beautification and even food production in and around the PA. These can be herbs, shrubs, garden plants or trees which after some time become acclimatized and then able to spread – especially if they have (or regain through gradual adaptation to their new habitat) one or more of the invasive characteristics listed above. These may be species which are benign (not invasive) in other situations where they have natural enemies but in a new locality are able to express their invasive tendencies. Or, for some flowering plants, it may take decades before a pollinator begins to visit the flowers and fertile seeds are produced.

Of course, there are many other pathways and vectors of alien species that enter a PA – such as people and their clothes, luggage, trade items, deliveries, steel containers, builders' materials, garbage and garden waste disposal, livestock movements, wild animal migrations, and natural events like storms and floods.

Biological invasions in protected areas

During the last century, it became clear to some PA managers that alien invasive species were having some negative impacts on their conservation efforts from within the protected areas. An early African example of this was in Kruger National Park in South Africa where the first list of invasive plants (6 species

of herbs and small shrubs) was produced in 1937 by Stevenson-Hamilton. Awareness of plant invasions in Kruger NP increased as more science was incorporated into management of the National Park with an estimate of 372 alien species recorded in the park, with the three most serious invaders being *Lantana camara*, *Chromolaena odorata* and the cactus *Opuntia stricta...*

During the 1990s, awareness of the risk of not managing invasive alien plants in PAs and the need to reduce the use of herbicides led to attempts (some successful) at biological control and integrated control of alien species invading PAs. Realisation that Climate Change was a factor that increased the chances of alien species becoming established and turning into invasives combined with the recognition that Global Trade was at the same time increasing in volume and reach and providing more and more pathways for introduction of alien species, led to the publication of the section on managing invasive alien species in the World Parks Congress (Durban, South Africa, 2004) publication of the IUCN World Commission on Protected Areas under the chapter on "Designing protected area systems for a changing world" entitled "2.4.5. Combating invasive alien species in protected areas" (Barber, 2004). This article exhorted protected area managers to abide by a list of ten approaches as derived from the IUCN Guidelines (ISSG, 2000) and the GISP Global Strategy on Invasive Alien Species (McNeely *et al*., 2001) which can be summarized as:

1. Establish the prevention, detection and eradication or control as a priority objective for PA management
2. Raise awareness of invasion threats in PAs with other government agencies, local communities and relevant businesses
3. Prevention should be the main strategy, but eradication should be used if it fails and control employed if eradication fails
4. Introduction of any alien species to PAs and surrounding areas should be legally prohibited
5. Early detection and rapid response capacity should be encouraged
6. Special emphasis should be given to invasions in vulnerable habitats and areas of high native biodiversity
7. All stakeholders inside and outside PAs should be consulted and involved in invasion management
8. Eradication and control methods should by socially and ethically acceptable and not affect native biodiversity or human endeavor
9. Re-introduction of species absent from PAs should consider the risks of invasion
10. Invasion information should be shared amongst PA managers and other relevant agencies\

Invasive Pistia stratiotes in an impoundment of the Sissili River (Burkina Faso) together with native Lemnaceae and Ludwigia stolonifera

Apposite as these recommendations may be, they appeared at a time when many PA managers and management systems in Africa did not have the resources – human, material or financial – to allocate to this issue. However, the presence of alien invasive species, especially plants, is gradually becoming recognized as a serious impediment to management effectiveness in African PAs. Some are now developing systems to identify alien species, recognize plant invasions and publicize this situation in the hope that they can prepare to prevent and manage such invasions…

The relative importance of invasive species in relation to other influences damaging protected areas

Protected areas conserving biodiversity in Africa are beset by many drivers of disruption of the basic intentions of the managers – to conserve native biodiversity *in situ* and, in most cases, make it available for research and tourism – at least in part… These negative influences vary in significance from place to place, country to country (see the results of PA management effectiveness assessments

conducted by IUCN-PAPACO since 2008 on www.papaco.org) and usually include:

- Wild fires
- Illegal hunting (poaching)
- Unlicensed harvesting of natural products – for use or sale
- Illegal prospecting and mining
- Water pollution, air pollution and waste disposal
- Grazing of domestic animals
- Diseases of wild animals and plants
- Severe storms, droughts and floods
- Roads and traffic
- **Biological invasions**
- Climate Change

In general it is not possible to rank these in any way because they vary from place to place. This author would like to suggest, however that biological invasions are likely to be significant threats in every PA that is physically managed by PA authorities (some no-go areas or reserves may be the exception). Whether or not the threats of biological invasions are being (or should be) managed is the purpose of this assessment – in relation to a range of PAs across a range of climates in West Africa. What is clear across the African continent is that invasions are increasing in number and (negative) impacts and that the responses are varied – from no action to detailed prevention and management…

The extent of this problem is still being elucidated as more and more PA managers come to realize the potential threats from alien invasive plants and the fact that there incidence is increasing and their damage becoming more noticeable.

One of the major threats to PAs in Africa which can be exacerbated by invasive species is that of wild fire and fire escaped from controlled burning. This happens for several reasons because invading plants usually grow faster and produce more vegetative material than the native species that they invade – adding to the fuel for wild fires and also making then hotter. Some invading species have aromatic oils that are flammable and result in hotter and faster spread of fires as in *Lantana camara*. Another is the growth form of some invasive plants - again *Lantana camara* is the example. This widespread invader (in Africa) has been shown (in Australia in dry forest equivalent to savannah) to not only increase the fuel available, but by climbing trees up to the crown and so taking ground fires upwards to become crown fires – which are much more destructive to dry woodlands.

Another association is the link between plant invasions and **Climate Change**. Acting together, the impacts of each of these drivers of change are compounded and interactions between these two threats present even greater challenges to field conservationists, especially protected area managers. The most evident is the survival of invasive species when climate change has brought about local changes (in temperature, humidity, precipitation) which native species of plants cannot adapt to in time to survive while alien invasive species, due to one of their basic characteristics being a broad tolerance of environmental characteristics, are able to survive and thrive.

Cecropia peltata, Ankasa NP (Ghana), beside the access road into the forest

Climate change is expected to bring about more and stronger storms, floods and waves in fresh and marine water – all of which may give advantage to invading species (as above) and also increase their dispersal through violent movements. A common characteristic of invading plant species is their ability (indeed sometimes preference) for establishment in degraded areas resulting in a healthy population which can then invade vegetate areas with ease. Climate change will increase the areas of degraded landscape as a result of changes in rainfall and temperature and the demise of local species die-off leaving bare or uninhabitable habitats where invaders can settle. This general aspect of climate change bringing about degraded areas will also require that agriculture and perhaps livestock rearing may have to move to more suitable areas – thus

increasing or changing trade routes for agricultural goods – which are inevitably pathways for invasive species. It has also been suggested that climate change may remove or change the cues that native plants need to flower or germinate – thus reducing their populations even further, leaving degraded areas where invasives can settle.

J. gossypiifolia in northern Ghana

A more subtle interaction is possible if native species either manage to adapt quickly to new conditions brought about by climate change or they are helped to do so by moving populations to new areas ("managed relocation") and then, being in a different habitat or even ecosystem, they are now alien and thus could become invasive.

Climate change can bring about advantages to biological invaders (and even create them). The researchers involved in invasion biology and now faced with an added and real threat to find ways to counter – in general and in PAs. But knowing that such impacts of climate change on inceasing prevalence and impacts of invasive species is helpful knowledge for PA managers to add to their (ever-growing) list of items to be considered in their management routines and in applied research in their PAS.

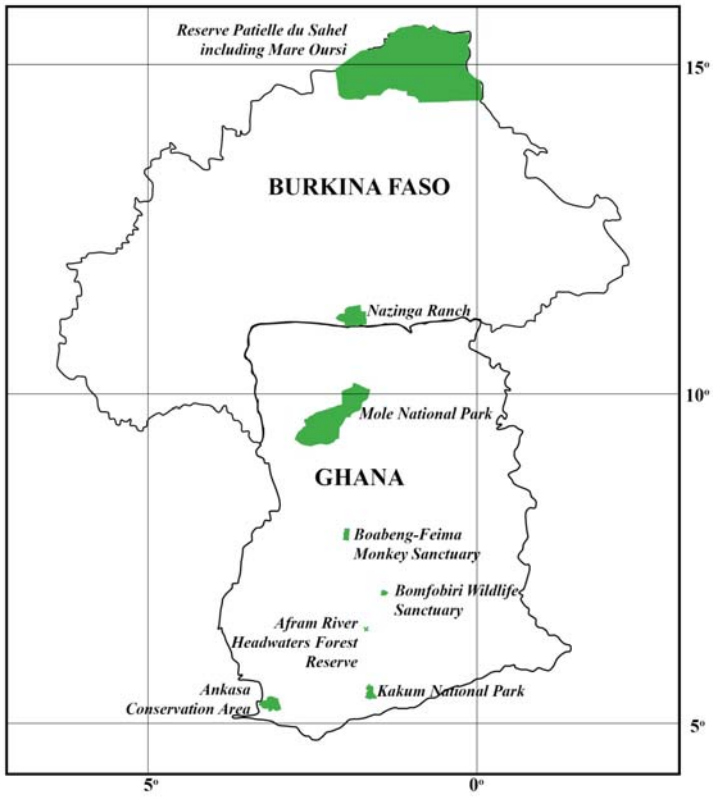
Addressing the invasive species problem in protected areas

Biological invasion of biodiversity in protected areas is a complex problem because, first of all, it is often difficult to distinguish a new (alien) species of plant when it is in amongst the native vegetation that is being conserved: this is often a specialist's skill and such specialists are rarely available when needed. It is also difficult because awareness about the extent and range of invasive species in PAs is often limited to a few people (often at senior levels) who are too busy to make the necessary monitoring possible that is needed to recognize alien and possibly invasive species. Also, there are often conflicts over whether an invading plant can be used rather than removed – for various uses that seem to outweigh the threats to biodiversity. Then, even if such species are recognized and a decision is made to reduce or remove their negative impacts, solutions are not always known or available… or are not a priority for PA management.

The purpose of this study was to take a first step of recognizing some of the more common plants that could be invasive in a range of PAs in dry to wet areas. The report (please see www.papaco.org) on a quick assessment of easily detectable invasive (or potentially invasive) alien plants in some PAs in West Africa covers a range of ecosystem types from Dry hot Sahel to Wet Tropical Forest from northern Burkina Faso to southern coastal Ghana (see Figure thereafter). It will allow us to draw some conclusions that could assist PA managers to prepare for, prevent and manage plant invasions in the future (see next NAPA letter)…

Ideally such an assessment would stretch over a full year to encompass all seasons – especially where rainfall is limited or restricted to certain months. This was not possible during this study as it was in the dry season – which was selected to enable ease of movement within and between the Protected Areas. Thus alien herbaceous herbs and shrubs may need the rains to germinate, to become evident or to produce flowers that facilitate their recognition. In this way we probably missed species that are abundant or obvious at other times of the year.

Senna occidentalis



Map of the protected areas visited – from North to South. 15°N is in the Sahel ecosystem; 5°N is in the high rainfall warm Tropical Rain Forest zone near the Atlantic Ocean coast

The full results of this study are presented on www.papaco.org

In the next NAPA newsletter : prevention and control of invasive species…

The Zoological Society of London's EDGE Fellowships

The Zoological Society of London's EDGE of Existence programme (www.edgeofexistence.org) is the only global conservation initiative focusing specifically on threatened species that represent a significant amount of unique evolutionary history. One of the most effective ways in which the programme is working to secure the future of EDGE species is by awarding two-year Fellowships to future conservation leaders ("EDGE Fellows") working on poorly-known EDGE mammal, amphibian or coral species. We are now accepting applications for the 2013-15 Fellowship Programme.

EDGE Fellows follow a comprehensive two-year training programme comprising of:

- A 4-week Conservation Tools training course in Kenya (location to be confirmed) at the beginning of the programme to provide Fellows with essential training in techniques to plan and implement their project;
- A grant to undertake a 2-year project on a top-priority EDGE species;
- Ongoing technical support/mentoring (achieved via online modules, web-based tutorials/seminars, and field visits) throughout the Fellowship;
- A 2-week Conservation Leadership training course in London on successful completion of Fellowship to help Fellows prepare for the next stage of their career.

The application form, guidelines, and eligibility criteria are available to download on the EDGE of Existence website (www.edgeofexistence.org/conservation/fellows) or can be requested from the EDGE Fellows Co-ordinator (cath.lawson@zsl.org).

Next application deadline is 31 March 2013

Business Skills for Protected Areas

Are you responsible for managing a natural World Heritage Site or a Protected Area on a Tentative List for inscription? Would your organisation benefit from having better business planning skills? If the answer to the questions above is yes, then this is your opportunity to take part in a fully funded, training programme with business planning experts from Shell.

Please follow the link below for more information. **The application round opens 11th March and closes 6th May.**

http://www.earthwatch.org/europe/our_work/corporate/shell/whs_intro/

BIOPAMA: what's it?

Developing capacity for protected areas in Africa, the Caribbean and the Pacific…

The richness and diversity of the plants, animals and ecosystems in protected areas of many countries in Africa, the Caribbean and the Pacific provides services to local people and communities in and around these areas. The protection and sustainable use of these resources can help reduce poverty and provide benefits for urban areas and communities located far from the protected area itself. However, in most countries there are often information gaps and a lack of adequate capacity to plan and effectively manage protected areas.

BIOPAMA – Biodiversity and Protected Areas Management Programme– seeks to address this challenge. The programme was launched by the European Commission in July 2011 and it is financially supported with Intra-ACP (Africa, the Caribbean and Pacific countries) resources from the 10th European Development Fund (EDF). This programme has two main components: one on protected areas which will be implemented by IUCN and the European Commission Joint Research Centre (JRC), and another on Access and Benefit Sharing (ABS), which will be implemented by the Multi-Donor ABS Capacity Development Initiative managed by the German Development Cooperation (GiZ).

BIOPAMA will combine a variety of approaches:

By improving access to and availability of relevant data and information on biodiversity, climate, natural resource management, governance and socioeconomic issues, the programme aims to enhance the management of protected areas and national systems of protected areas. Regional capacity building programmes will be developed in partnership with existing institutions, such as regional training centres. These programmes will train decision makers and protected area managers in order to increase support for protected areas and put in place capacities that enable effective and equitable management of well governed protected areas. They will also involve updating and expanding curricula on conservation and protected areas, as well as developing tools to solve regional conservation issues.

BIOPAMA's protected areas component is implemented by IUCN and the European Commission Joint Research Centre (EC-JRC). The partners will work together to establish Regional Observatories. These observatories will enable the provision of relevant data and information to assist in better planning and decision making as well as exchanging knowledge.

IUCN will implement BIOPAMA through its Global Protected Areas Programme, its European Regional Programme, four regional offices and two commissions, the World Commission on Protected Areas and Species Survival Commission. This programme is a unique example of how to integrate all of IUCN's main components - Secretariat, Commissions and Members – under the umbrella of IUCN's "One Programme" approach. BIOPAMA will also enhance regional partnerships, as well as strengthen existing global partnerships such as those with the United Nations Environment Programme's World Conservation Monitoring Centre (UNEP-WCMC) and the European Commission/Africa, the Caribbean and the Pacific (EC/ACP) Secretariat.

More on www.iucn.org

To read…

On the journal "**Pastoralism: research, policy and practice**" this month, interesting articles about pastoralism and wildlife such as: "*clarifying competition: the case of wildlife and pastoral livestock in East Africa"* (Bilal Butt, Matthew D. Turner)" or *"co-existence of wildlife and pastoralism on extensive rangelands: competition or compatibility?"* (Maryam Niamir-Fuller, Carol Kerven, Robin Reid, Eleanor Milner-Gulland)", *etc.*

Please visit: http://**www.pastoralismjournal.com/series/WP**

West African Environmental associations are strengthening their beekeeping capacities in Benin…

An increasing number of projects supported by PPI-FFEM (small grants) are putting particular emphasis on the development of beekeeping activities. Many factors can explain this renewed interest of local NGOs. For example, the potential incomes that may be generated by this activity, the sustainability of this economic option if designed over the long-term and the opportunities it offers to reduce human pressure on natural resources.

From 18 to 20 December 2012, the PPI program organized an experience-sharing trip to the joint company "Ruche des Collines, RDC" based at Yaoui (about 330 km in the North of Cotonou) for six associations benefiting from a PPI grant. For the eleven representatives of AGEREF-Bala, AFAUDEB and Impulsion (Burkina Faso), ADT and AE2D (Togo), AFEL (Benin) who have diverse experience in the issue (some associations will soon start beekeeping activities while others have already been producing and selling honey for many years), this trip was aiming at taking inspiration from RDC experience. In this structure, created in 2009, about sixty beekeepers are collaborating under the leadership of Alphonse Worou, beekeeper since 1993. In this company, one thousand beehives are set up and will soon be operational, with an annual output of up to 45 litres per hive. The approach developed by RDC based on entrepreneurship is all the more interesting that the structure's vision is to have beekeeping considered as a sustainable economic activity, and not an activity to be carried out just for a project lifetime. An evidence of the interest of the approach is that Mr. Worou has won the joint entrepreneurship award of the Fondation Ensemble in 2011.

The RDC honey farm which has been operational for approximately one year was visited and the different steps, from raw honey reception to bottling and labelling were explained to participants. RDC have got support from SENS-Benin (Solidarité Entreprises Nord-Sud, a common interest cooperative society) regarding issues related to trading and search of markets. SENS is selling a range of products (bottled or in bulk, in the form of spread, therapeutic or for "pleasure"…) at Yaoui Kilibo in Ouèssè community and also in the country's large cities (Cotonou, Parakou, Porto-Novo…). Thus, in 2011, RDC has made more than 2 million CFA (4,000$) profit from the selling of beekeeping products. For 2012, the estimates of June already indicated an income of more than 2 million CFA.

The participants visited many apiaries set up and monitored by Mr Worou and saw how the hives were functioning. Mr Worou mostly uses the Kenyan concrete hive. According to him, this hive is more durable because it is resistant to bush fires that are common in the area, and it is relatively easy to maintain. The criteria for identifying the ideal site to set up an apiary were discussed and melliferous plant species identified. The beekeeper insisted on how he raises populations' awareness, be they beekeepers or not, on plant protection as plants are food for bees and they enable honey production. Mr Worou also enriches plant species on the sites where the apiaries are set up.

Regarding the selection of the groups of beekeepers collaborating with RDC, the system is operated in the

form of a tontine[2]. Each tontine is composed of about 10 members and has about a hundred of beehives. Regarding the choice of the beneficiaries, A. Worou favours collaboration with the populations living in mostly degraded areas of forests because his work also aims to replant and rehabilitate these sites. Besides, the areas where children schooling rate is relatively low are also the ones chosen to set up beehives because, according to Mr Worou, honey production and selling can generate incomes, a part of which can be used to cover school fees.

According to the melliferous species that are mostly present on the sites, RDC produces specific honey from cashew (*Anacardium occidentale*), Cosso (*Venn, Pteurocarpus erinaceus)*, Neem (*Azadiratcha indica*), eucalyptus (Eucalyptus sp.) in addition to the "mille fleurs" honey commonly produced by most of the beekeepers.

Participants were also able to experience beekeepers' work through taking part in various beekeeping activities. They were also able to participate to the decanting of bees from small hives to bigger ones during the visit to the apiary of the Ekpa village tontine, to talk about the specific precautions to be taken during the decanting in order to avoid that bees escape from the hive after transfer. Beehives in the process of producing honey were also visited in the village of Kémon. The different categories of bees and the different stages of honey production were also identified. M. Worou also presented the process of honey harvesting in the presence of the members of the Kémon tontine.
There were also discussions with members of tontines of Ekpa and Kémon villages, partners of RDC, on how to organize tontines, the constraints linked to beekeeping production, the advantages related to beekeeping activities. Lessons were learned from each other, as the members of the tontines also asked to the associations taking part in the trip how they were doing beekeeping, especially AFAUDEB which has a long beekeeping experience in Burkina.
Finally, one major interest of this trip is that it was an occasion for many active beekeeping stakeholders to meet, discuss and share experience, and this will contribute to the development of a form of beekeeping that conserves and sustainably generates incomes in West Africa.

When beekeeping goes with conservation: Alphonse Worou tells the story …

Alphonse Worou was eager to share his experience regarding the link between beekeeping the conservation and the restoration of the plantings that populations had destroyed for various reasons (beekeeping, logging, charcoal production, etc).

The first experience started in 2002 at Yaoui, with the setting up of an apiary composed of 24 beehives in a former agricultural plot. This plot of about half hectare belongs to his uncle who had cleared the trees to cultivate, but later complained to Alphonse Worou about the very low yields. Convinced that the properties of the land were not appropriate for farming, M. Worou succeeded it getting his uncle's agreement to set up beehives to replace farming activities. At the same time, he planted various species, notably melliferous, to restore plant diversity. He mostly planted endangered species of the region with the purpose that "future generations will also know these species".

[2] *RDC signs a contract with the beneficiaries, provides hives and other equipment required for the beekeeping activity and commits to buy their production at a price that is generally more interesting than on the local market. In return, the beneficiaries engage to progressively pay back over 3 years the amount of the equipment they received, after what the hives become their property. From that time, they can buy shares at RDC and become members. RDC succeeds in selling his honey a little bit more expensive because of its better quality, the specific honey flavours and mostly because of the marketing done by SENS.*

When the participants to the trip visited the site, that is ten years after the beginning of the activities, they found a reconstituted multi specific forest. For each harvest (about 500 litres per year for the whole apiary), Alphonse gives a part of the production to his uncle. His uncle told him that the yield of his cashew orchard located around the former farm has improved, as it seems that bees enable their pollination. Worth noting is that illicit logging has significantly reduced in the area, as the presence of bees dissuades potential offenders, mostly those equipped with chainsaws, as the loud made by the engine strongly irritates the bees and make them aggressive.

A second site they visited, a forest portion of about 1.5 ha, strongly degraded by the overexploitation of natural resources by local populations, is located at the bottom of the highest hill of Yaoui. Thanks to the authorization he got from the local forestry department to restore the vegetal cover, A. Worou has installed about 26 beehives since 1997, with the idea that additional hives could be installed by other inhabitants of the area. Presently, the area encompasses a completely reconstituted forest without any reforestation having been done there. This completely natural regeneration is the result of efforts done to convince bordering populations to stop cutting trees (even if they do not really have the choice, as they can be attacked by the bees).

Aware of the annual output of A. Worou's beekeeping activity, the bordering populations have expressed the wish to also set up beehives and benefit from his experience. Nurserymen from various parts of Benin now come to collect seeds of vegetal species that are no longer found elsewhere, and traditional healers also have access to the forest to rationally harvest samples of medical plants taking care of not endangering these plants. This reconstituted forest (called "*la forêt d'Alphonse*") is presently populated with various animal species (grasscutters, porcupines, snakes (including boas), « antelopes, lizards, hares, monkeys…). Finally, another important fact is that the river crossing the forest flows longer along the year since the forest's reconstitution, thus reducing the problem of hydric stress that the village used to experience. The river banks have been strengthened by vegetation and fishing is progressively becoming a money-making activity for local populations…

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A website (in French) has been created to highlight initiatives conducted by NGOs and associations working with IUCN-PAPACO through the "Territoire de Conservation" (TC) project and the Small-Scale Initiatives Program (Programme de Petites Initiatives-PPI.3) both funded by the French GEF. The website also aims to provide to Civil Society Organizations which are active in the field of conservation tools, methods and documents as well as information about funding opportunities.

For more information:
http://www.iucn.org/fr/propos/union/secretariat/bureaux/paco/programmes/ap/projets_et_thematiques/societe_civile_et_initiatives_locales_de_conservation/

NAPA – CONTACTS **www.papaco.org and www.iucn.org**

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