Biodiscoveries
Mata da Machada e Sapal do Rio Coina

LEARNED LESSONS WITH PROJECT LIFE BIODISCOVERIES

Barreiro

Reserva Natural Local
Sapal do Rio Coina
Mata da Machada

RESUME

The project (LIFE Biodiscoveries - Invasive species control through public participation, LIFE13 BIO / PT / 000386) started in July 2014 and will end in July 2020. The objective was to control invasive exotic species in the National Machada Woods and Coina River Saltmarsh, areas that constitute the Local Natural Reserve (RNL), through the involvement of volunteers.

The project aimed to create long lasting bonds between people, the combat of invasive species and management of the natural heritage as a way to guarantee the continuation of control actions for these species after the end of the project.

This option relates to the belief that resources involved and the time needed to maintain an effective invasive control program, extends well beyond financing and human resources available within the public sector.

For this reason, it was given preference to a lighter intervention, namely ring-barking and manual plucking, to the detriment of cutting and using phytopharmaceuticals.

Based on a small professional team of forestry workers - which was made up of prisoners of the Montijo Prison – and on a technical support team, including technical management skills, communication, volunteer management and administrative and financial management, the project demonstrated the advantages, and weaknesses, of using volunteering to control invaders.

Over these six years of fieldwork, the results are evident; the area of invasion by ice plant (*Carpobrotus edulis*) was totally intervened, being able to affirm at this point, that this species has been practically eradicated from the RNL. Regarding acacias (*Acacia sp*), there was a visible decrease in the area of invasion, in which it was decided to work primarily within the outer area of the invasion and later within the denser nucleus, that requires a higher labor intensity

PROJECT GOALS

Total staining of the project plots and location of the plots under analysis

Invasion on August 16th, 2014

Invasion on July 27 th, 2019

In the National Machada Woods there was a strong invasion of seven species of acacias (*Acacia sp*) and ice plant (*Carpobrotus edulis*). Already in the Coina River Saltmarsh, the dominant invasive species was the ice plant and there were occasional acacias.

Thus, the main goal of LIFE Biodiscoveries was the control of these invasive species, triggering a social dynamic of mobilization of volunteers who, in the future, are intended to maintain, with the consistent management of the RNL.

The RNL area where the intervention was intended was divided into plots, and initially, volunteers were expected to adopt these plots, being responsible for controlling the invasive species within the adopted area.

It was estimated a total area of plots of approximately 20 hectares (just under 10% of the total area of the woods) and that represented about half of the area with a more severe invasion of acacias.

It was also intended to have the main points of invasive species presence intervened. It should be noted that, if they are intervened upon, it does not translate into controlled, since the project duration is not enough to ensure that the seed bank is exhausted, that all acacias die and that there is no further regeneration.

With LIFE Biodiscoveries it was also intended to test the difficulties and the advantages of using small ruminants to control acacias. Finally, it was also planed that some trails already existing in Machada Woods could be upgraded as a result of the planned interventions in the project.

Being a project that involves the community and eradication of species within a forest area, the communication part was fundamental for its success. It was necessary to find a communication channel to let know the problem existing with the presence of these species, to attract volunteers and to publicize the results.

GLOBAL EVALUATIONOF THE PROJECT'S IMPACT

Overall, the project made it possible to circumscribe the invasion, containing it in a more restricted area than the initial one, practically stopping expansion areas of the acacias and ice plant. This result can only be maintained in the future if, periodically, the areas where acacia trees and ice plant were present are monitored. It will be necessary to assess if there are points where acacias or ice plant have survived, so they can be eliminated during the early stages of re-invasion.

The project also allowed the creation of a small but consistent group of volunteers who dedicate part of their time to maintaining the forest, working as a magnet for new or occasional volunteers and for promoting the RNL's management actions.

It was also possible to place the RNL as a destination of voluntary actions organized by third parties, namely corporate volunteering, directly or mediated by NGOs, which created a flow of specific voluntary actions that, as a whole, represents a good tool for invasive species control, which is expected to remain in the future.

However, the difficulties posed by almost five years of drought, with relevant impacts in the ring-barking of the acacias, pushed the project towards new actions such as the restoration of the Zebro Stream, forseen years ago, but never executed, with very positive results in motivating volunteers. It is expected that this action will contribute to a faster recovery evolution in riparian systems, deeply affected by forestry interventions at the beginning of the 20th century.

Regarding the ice plant invasion, it practically disappeared, being only necessary to guarantee a situation to prevent re-invasion.

The invasion by acacias persists, in large areas, but it was controlled in about half of the initial area, with interventions already carried out that are still

expected to show results. As such, it is expected to demonstrate the usefulness of the effort in significant areas, where the invasion is far from being controlled at the end of the project.

Unfortunately, it was not possible to test the use of goats to control acacias, but it was possible to carry out tests on the use of controlled fire in previously intervened areas, as an invasive management tool, with interesting results at the seed bank level.

TECHNICAL ASPECTS LEARNED

As previously referred, the project focused on the control of the ice plant (*Carpobrotus edulis*) and the seven species of acacia in the RNL: *Acacia dealbata* (silver wattle), *Acacia longifolia* (long-leaved wattle), *Acacia mearnsii* (black wattle), *Acacia melanoxylon* (australian blackwood), Acacia pycnantha (golden wattle), *Acacia retinodes* (swamp wattle) and *Acacia saligna* (orange wattle).

Regarding the ice plant, an invader whose control intervention is very easy to carry out using voluntary work and good results are expected, the operation focuses on plucking the plants from the soil. This method can be performed all over the year; however, it is easier and more pleasant when the soil is cool and moisted.

Initially, the uprooted plants were deposited on plastic screens, to avoid the direct contact with the

Species	Ring-barking throughout the year	Need to continue field interventions	Germination	Death after the intervention (approx.)	Ease of voluntary work (ideal season)
Acacia dealbata	No	Yes	Strong	6 months	Easy
Acacia longifolia	Yes	No	Very strong	3-4 months	Very easy
Acacia mearnsii	No	No	Strong	6 months	Easy
Acacia melanoxylon	No	Yes	Weak	12-16 months	Easy
Acacia pycnantha	No	Yes	Weak	4-8 months	Moderate
Acacia retinoides	Yes	No	Weak	6 months	Easy
Acacia saligna	Yes	No	Weak	6 months	Easy

ground. Later it was found that the degradation of plastics caused relevant pollution problems, so it was decided to join small clusters of removed ice plant, periodically monitored to identify any germination.

Regarding the control of acacias, the technique used in all species was ring-barking, however, it was discovered that the results obtained differ depending on the species, as the following table shows.

Work carried out by other projects indicates that there are times of the year when the ring-barking takes place more easily and results are better. However, it was chosen to extend the operation throughout the year, reinforcing the work continuity, with particular attention to the sprouting, especially in *Acacia melanoxylon.*

In the beginning, it were also carried out operations of germination plucking, however quickly it was found that it does not pay off the effort of plucking the spring germination, and the options was to subject younger plants to the effects of temperatures and possible heat strokes during the hottest months of the year.

After this period, when it was verified that the overwhelming majority of germination dies, the plants that had resisted were uprooted. Death of germination in the summer due to the effects of temperature, was particularly evident in areas with *Acacia dealbata*.

WHAT WENT WELL?

The project had a very positive effect on the mobilization of the municipality for the management problem of invasive species. The integrations of the project in already existing activities related to the environmental awareness, more specifically for biodiversity and conservation of the RNL's, conferred a great potential.

In the future, invasive control actions are expected to remain, in a way to intervene in areas where LIFE Biodiscoveries was unable to reach, but also in the maintenance of intervened areas that, surely, will have some re-invasion.

The ice plant was practically eradicated, subsisting a small confined core, which will have to be assessed, year after year, to see whether re-invasion will occur.

Corporate volunteering played an important role in public involvement, not just for the work of the participants, but also for expanding communication on the problematic management of invasive species.

Initially, it was assumed that companies would adopt plots, being responsible for their maintenance over time. However, as the project continued and after several meetings about voluntary initiatives aimed at companies, it was easier to involve these groups in larger, one-off actions, channeling them to prioritize tasks within the project.

As such, it was possible to come up with a model close to what companies look for in terms of social and environmental responsibility.

LIFE Biodiscoveries also had a great impact on launching a restoration process of riparian ecosystems associated with Zebro Valley Stream. Right now, what was a forest ditch running in the inaccessible interior of a closed population of invasive species, is a site recovering with biodiversity increase.

Besides the renaturalization of the stream profile, there is also the entrance of light. The fall of the treetop of ring-barked trees induces great incorporation of organic matter in the riverbed and its surroundings. The first restoration tests were performed in hygrophilous habitats, by diverting the flow of the stream to promote areas of favorable development of this type of habitats.

The project also made it possible to carry out the first tests of controlled fire in the management of invasive species, with very interesting results in the germination induction and relevant evidence of probable induction of sprouting acacias and reduction of natural regeneration time after their ring-barking.

In the beginning of the project, it was necessary to replace the forestry workers, which were supposed to be employees of the municipality, for prisoners of the Montijo Prison. This change created some implementation difficulties, resulting from greater technical and logistical support that it was necessary to provide, but in return had very interesting social effects related with the integration of prisoners, preparing them for life after serving sentences that have been applied to them.

The Municipality of Barreiro, and its technicians, nowadays are much better prepared to deal with volunteering on long-term projects, either regarding ways of capturing volunteers, either regarding maintaining the motivation of the volunteers, an issue that was wrongly omitted from the project. The necessity to find new ways to deal with difficulties that arose was a good learning experience for the entire project team.

Exchanges of information and knowledge with many other people who work with invasive species, volunteering and ecosystem restoration were important to improve the project's execution.

The possibility of using controlled fire in the invasive species control, a counterintuitive hypothesis, was the most unexpected and interesting external suggestion, made possible by doing trials to test the hypothesis, with further results to study in the future.

Schools' interest in ice plant removal was also a good result of the project, opening up possibilities for the future involvement of these entities in the activities of the regeneration of acacias' seed bank and follow-up activities to detect outbreaks of re-invasion.

The project also allowed a reinforcement of the recognition of social impact for natural values associated with the Local Natural Reserve.

Finally, the number of entities, such as municipalities, military units, associations, among others, that sought the project, to evaluate methods and results in areas of invasion, demonstrated the usefulness of the work carried out by LIFE Biodiscoveries.

WHAT FAILED?

The effects of ring-barking on acacia trees took longer to appear than expected, with negative effects on the motivation of volunteers and development of planned follow-up actions, that had to be postponed.
The monitoring of volunteers was not always close enough, with flaws that harmed the development of actions.

Four years of drought in the middle of the project had a devastating impact on the motivation of volunteers and the effectiveness of the inmate team, to which the effects of some storms were added that forced to divert the work from the control of invasive species removal to maintain security conditions for the users of the woodland.

The participation of target groups, which was assumed in the beginning of the project to be an important source of participation, such as scouts, the elderly and cultural associations and recreational activities in the region, failed unexpectedly, only partially offset by the surprise of the good response of individuals and informal groups.

The communication strategy failed in several aspects, either in proximity to the volunteers or with the inglorious effort to capture target groups, who turned out to be little interested, either without conditions to correctly anticipate problems, for example, the time gap between the ring-barking and the death of the trees or the variations in the ease of intervention, which limited the ability to manage expectations.

Academia and community involvement also did not correspond to what would be expected, making it impossible to carry out field works with university students, as planned.

IF THE PROJECT STARTED TODAY, WHAT WOULD WE DO DIFFERENTLY?

The volunteering model would be less oriented for pre-defined target groups and more for the creation, and maintenance, of a solid and flexible volunteer base, using the relationships between each new volunteer that arrives and those that have already joined the project.

It would have been important to involve the volunteers more in project management, associating them not only with the tasks execution, but also planning and top decision on the project development options.

Proximity monitoring of volunteers should have had a greater expression, and formalization, with regular team-building activities and social and environmental responsibility.

That is, in addition to the existence of open channels of communication (that existed), and often performed activities that brought together different groups of volunteers, strengthening the monitoring of their fieldwork.

It would be especially relevant to have been more consequent in the joint evaluation of results, and monitoring the side by side work. Volunteer engagement initiatives should be more regular, promoting the meeting and strengthening mutual relations between volunteers and the project.

The creation of the action “Invasão ao Domingo” (Sunday Invasion) was already a step in this direction, but it would be useful to develop more and better regular contact mechanisms and face-to-face discussion.

One-off actions aimed at larger groups and less related to invasive control, that are typically used by companies, should be privileged as communication mechanisms and as a way to attract new volunteers, in addition to its real effect on invasive control and management of the natural values of the RNL.

The work with users of the Forest, who have the most diverse motivations, mainly for recreation and well-being, should have been strengthened, with actions specifically designed to involve regular users within the space management.

Sharing the results, specially by using “before and after” images, should have been more in-depth, even in the early stages, still with only a few results.

RECOMMENDATIONS FOR THOSE WHO WILL BE DOING A SIMILAR PROJECT?

The involvement of volunteers in the control of invasive species depends on the ability to create long-term intervention mechanisms, knowing that the motivation of volunteers is circumstantial and fickle, and those involving organizations, however solid they are, it does not guarantee, by itself, the constancy of medium to long term interventions.

In this sense, it seems appropriate to concentrate efforts on creating a process that facilitates the aggregation of ordinary people, with the motivational inconsistency of each individual.

To achieve objectives of this type, it is necessary to work on support instruments and to draw constant motivation initiatives and participation of new volunteers. For example, it could have been useful the creation of a websig where it was possible to see the evolution of the invasion, allowing a better perception, at each moment, of how the effortn of each one was reflected in the global situation.

In support instruments, special platforms that allow the simple registration of interest of volunteers become more important, combined with information exchange mechanisms (databases contact details, social media pages, WhatsApp groups, etc.).

In engagement actions, it is essential to ensure frequent actions that aggregate small groups of volunteers in consistent work of intervention on invasive populations, trying to create a group dynamic resistant to the erosion of the motivation of volunteers, but it is also necessary to design more breathtaking actions, involving occasional partners and volunteers, as a tool for joining new participants to the base group and constant intervention mechanisms over invasive species.

The creation of a small technical team, whose main mission is to support specific work with volunteers, including working together with everyone - the project was developed with great segregation between technical work and voluntary work which, and while having some advantages, came to be revealed as a solution that prevented the enhancement of voluntary work - with special techniques, but above all, a vocation for relationships appears to be a fundamental requirement for the success of such a project.

The technical difficulties of the control actions, and its dependence on plant phenology, which responds to weather conditions, advises the design of projects that include complementary activities to guarantee the interest of volunteers in periods, which can be long, where intervention on invasive species is not possible or it is too difficult.

Expectation management is fundamental and anticipating difficulties arising from the conditions or the mismatch between fieldwork and achieving results is essential for avoiding disenchantment, so monitoring results made by volunteers has to be very close and with very clear communication of results.

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