



FAUNA & FLORA INTERNATIONAL'S

Weaving for Nature

Developing successful plastic waste-based enterprises:
lessons learned from Nicaragua

INTRODUCTION

FFI began the Weaving for Nature initiative in 2007 as part of wider marine conservation efforts in Nicaragua aimed at improving protection of nesting sea turtles in and around the Rio Escalante-Chacocente Wildlife Refuge, and this has since expanded to FFI's other sea turtle conservation sites along the Pacific Coast. Along with poaching of adult sea turtles and their eggs, the prevalence of plastic bags littering nesting beaches was considered to be a threat, as they are known to be consumed by sea turtles. The Weaving for Nature approach was predominantly developed as a local livelihood initiative to reduce the drivers of egg poaching, whilst also removing plastic bags from beaches where they posed an ongoing threat to sea turtles and reduced the quality of the beach.

Plastic pollution poses a global problem, harming biodiversity, altering ecosystems and adversely affecting human health. With research into ocean plastics limited to the last two decades, it is possible that further studies will reveal other sinister impacts. Some of the solutions aimed at reducing plastic pollution in the world's oceans involve developing livelihoods around plastic upcycling – using plastic waste to create products that have a greater social/economic value. However, enterprises that rely on plastic waste have their associated risks and require careful consideration.

This paper reflects on the successes, challenges and learning from Weaving for Nature, to share our experiences with other initiatives that aim to tackle marine plastic pollution through developing livelihoods based on the use of plastic waste.



Jorge Martinez-FFI

PROJECT BACKGROUND

The Rio Escalante-Chacocente Wildlife Refuge (hereafter Chacocente) on the south Pacific coast of Nicaragua is an area of global biological importance, both for its sea turtle nesting beaches and for protecting one of the most important remaining fragments of Central American dry forest. FFI started working at Chacocente in 2001, when Halcyon Land & Sea¹ secured eight hectares of privately owned coastline and associated dry forest that was threatened by development. This area is now part of the wildlife refuge, and includes one of the region's four mass-nesting sites for the vulnerable olive ridley turtle, and a primary nesting site for the critically endangered Pacific leatherback turtle. However, the sea turtles faced significant threats from poaching of eggs and adults by marginalised local communities that relied on

the income from selling eggs and sea turtle products (e.g. shell). A sea turtle conservation programme was developed by FFI to address these threats at Chacocente and other nesting beaches along the Pacific coast of Nicaragua, including Estero Padre Ramos, a protected area that is home to the largest nesting population of critically endangered hawksbill turtles in the eastern Pacific Ocean. The programme implements a range of strategies including community ranger patrols, establishing community hatcheries, raising awareness and – through support from the Darwin Initiative – supporting local people to find a sustainable source of income, for example through Weaving for Nature. This livelihood initiative has the added advantage of reducing the prevalence of plastic bags – known to be consumed by and pose a risk to sea turtles – on nesting beaches.

¹A conservation fund established in 1998 to find innovative and entrepreneurial ways to secure threatened sites, funded by Arcadia – a charitable fund of Lisbet Rausing and Peter Baldwin - and Hugh Sloane.

WEAVING FOR NATURE INITIATIVE

The Weaving for Nature initiative was launched in Chacocente in 2007, as a partnership between FFI and WIDECAST (Wider Caribbean Sea Turtle Conservation Network), who were already implementing a parallel initiative in Panama, Costa Rica and elsewhere in Nicaragua. The initiative involves the formation of women's weaving groups, who collect plastic bags that are polluting beaches and weave them into products for sale, predominantly to tourists. The aim is to increase the household income of the participating women, thereby decreasing their incentive to poach sea turtle eggs, and at the same time to reduce the amount of plastic pollution on important sea turtle nesting beaches, to reduce the risk of sea turtles consuming plastic bags.

In Nicaragua, FFI initially promoted this initiative across five coastal communities and it has been fully adopted by one, namely Astillero, a community near Chacocente. These are the same communities with whom FFI is working more broadly on sea turtle conservation, as they neighbour beaches that have high levels of nesting and therefore egg poaching. The targeted communities were known to be poaching sea turtle eggs, including many of the weavers themselves, and/or their family members. These sites also have high levels of plastic waste due to the ready use of plastic by a relatively large population (attracted to the area by the potential income from egg poaching), a lack of waste disposal facilities, and consequent widespread discarding of plastic into the environment.



Alam Ramirez/FFI

THE PROCESS

Plastic bags are collected from sea turtle nesting beaches and surrounding areas by the weavers and their family members. Additionally, to supplement supply, networks with local shops, family and friends have been established to provide the weavers with discarded plastic bags. Once the plastic bags have been collected, the weavers grade the bags based on their feel². The weavers and their family members subsequently wash the selected plastic bags three times with

soap, disinfectant and water, and hang them up to dry for two days. Once the bags are dry, they cut off the bottoms and handles, leaving the 'body' of the bag, which is then cut into strips, creating plastic 'yarn' that can be rolled onto a bobbin, ready for weaving. The plastic yarn is then woven into a range of products (e.g. bags, purses and belts) of varying sizes. Once complete, the finished articles are transported from the rural project sites to be sold in popular tourist markets in Nicaragua.



Figure 1 Typical process undertaken by the weaving groups

Since 2007 FFI has helped to develop the initiative through providing technical and financial support including:

- Recruiting an in-country coordinator and mentor to oversee implementation and act as a focal point for training, developing market links and problem solving;
- Emphasising the key principles of the initiative, specifically the conservation objectives, the requirement that only littered plastic bags are used, and the environmental consequences of purchasing plastic bags;
- Developing appropriate management and governance of the weaving groups, including
 - establishing a board of trustees, assigning weaving group roles and legal registration;
- Building the weaving groups' capacity for business planning, enabling them to manage funds and members, produce high-quality products and define production parameters;
- Setting price points, developing the necessary infrastructure to ensure successful sale of products and providing resources and funding to produce marketing materials;
- Making recommendations based on a business strategy review.



²If bags are too flimsy for weaving (e.g. made of degraded, recycled or biodegradable plastic) they are either used for practising the weaving technique, or the initiative finds the most responsible possible way of dealing with them, as they are unsuitable for turning into woven products for sale.

SIGNIFICANT ACHIEVEMENTS

The Weaving for Nature initiative has successfully increased local income and contributed to a wider programme of work that has improved sea turtle conservation. There are also anecdotal reports suggesting that plastic pollution levels on and around beaches have reduced, and that women feel empowered as a result of the initiative.

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women weavers are currently developing products.

The initiative has helped to channel an average of

US \$125

in extra income back to each weaver per month.

More than

200,000

plastic bags have been transformed into products worth US\$5-60 each, and an average of 100 articles per month were sold³.

In Chacocente, the initiative has also contributed towards the impact of FFIs wider sea turtle conservation programme, which during the 2017/18 nesting season resulted in

no poaching

of leatherback turtle eggs from nests, whereas all nests were being poached prior to FFIs intervention.

Local community members report a significant

decrease in plastic pollution

on nesting beaches as a result of the initiative.



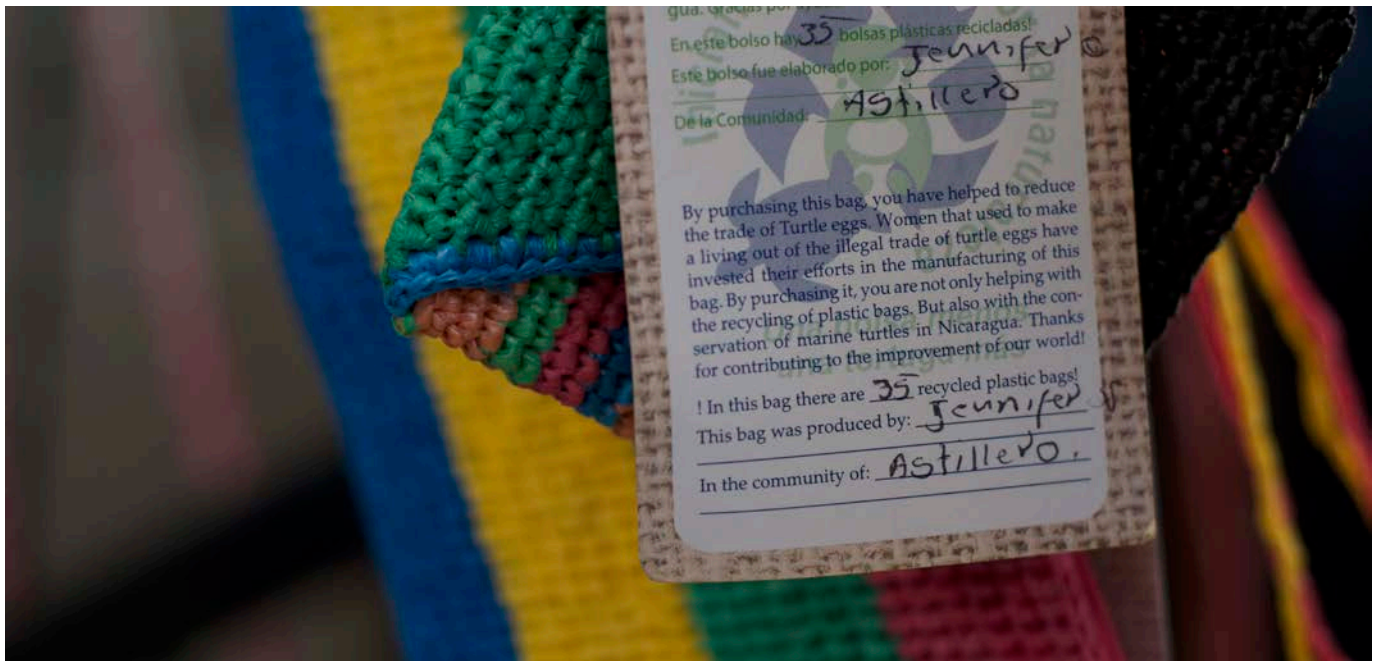
³Figures cover the period from 2012-2015.

CASE STUDY

The weaving group in Astillero is the longest-standing and most well-established group made up of 28 women. The group has a clear management structure, a coordinator, and a board of directors. They have established a 'demonstration workshop' in which the women can weave products, demonstrate the weaving technique to visitors and sell their products. With support, the group has set price points (determined by the size and type of the product and the average number of hours of work invested), developed direct market links to tourist hubs and improved its business

planning, marketing and branding. The Astillero weaving group has become a local champion, providing support to younger, smaller weaving groups.

This weaving group has also successfully established a unique brand identity – its products are seen as synonymous with sea turtle protection and clean beaches. This is a popular concept among tourists, therefore the bags have attracted increasing attention, including interest from high-end hotels in Nicaragua, which has enabled the enterprise to gain traction in a competitive market.



Alain Ramirez/FI

POLLUTION OUTCOMES

Reports indicate that the initiative has contributed to cleaner nesting beaches through reducing the amount of plastic pollution, and thus the risk of sea turtles consuming plastic bags. A woman from the weaving group in Astillero recounted:

“I feel that in some way we have contributed towards a change in Astillero, because if you came here six years ago, that field over there would be filled with bags that were being blown into the air towards the sea.”

As well as cleaning up what is on and around beaches, it has contributed to behaviour change, because the people engaged in the initiative no longer simply discard plastic bags – those that are suitable for weaving are given to the weavers, and the initiative identifies the most responsible way possible of dealing with those that are

unsuitable, such as putting them into whatever formalised waste management system exists at the project site.

Additionally, community members in Astillero feel very positive about the reduction in plastic waste, as they recognise the positive impacts on the environment:

“I alone with this project have recycled more than 8,000 plastic bags that had been thrown away in our community, and that, I think, is a great help for the environment”

and how this benefits sea turtles:

“We have a slogan that says: ‘one plastic bag less, one more turtle’. Because when we avoid a plastic bag going into the sea, a turtle cannot eat it, and that turtle can go on to reproduce.”



SOCIO-ECONOMIC OUTCOMES

The initiative has successfully increased household income, and empowered the women involved to take control over how this money is spent:

“I remember when I received the money from the first bags I sold, I was able to organise the first birthday party for my son.”

The financial results are self-evident, as the initiative has helped to channel an average of US\$100 in extra income back to each weaver per month, contributing on average 45% of household income in a region where the average salary is estimated to be US\$200 per month in a fishing household.

Participation in Weaving for Nature has been shown to improve the social status of the women involved. The in-country coordinator observed that:

“The weavers’ families acknowledge that they are working women, who provide income to their households, despite caring for their children, working in the house, or doing other economic activities.”

Men in the communities take the weaving work seriously as the women sometimes provide their

husbands with short-term loans (e.g. to buy fishing materials), and at times of financial difficulty they supply the household income.

Women were a disadvantaged group within these marginalised communities, but the initiative has brought them together so that they share a common purpose, and has boosted their self-esteem and sense of motivation:

“I am a grandmother. I am a wife. I am a housewife. I am also a weaver. I am Wonder Woman!”

As a result, the women are empowered to take more control over their lives, for example they are starting to use family planning to achieve their desired family size.

Additionally, providing women with fundamental business skills, including how to navigate negotiations and market their products, places them in an increasingly strong position within communities to capitalise on other economic opportunities. This initiative enables women to begin to develop social and economic autonomy in an area where employment opportunities are often male-dominated.

BIODIVERSITY OUTCOMES

Weaving for Nature has contributed to a significant reduction in sea turtle egg poaching among participating communities, as part of FFI's wider sea turtle conservation efforts. In particular, this initiative has provided families previously reliant on sea turtle poaching with sustainable livelihood options and changed attitudes towards sea turtle conservation, thereby reducing the incentive to poach eggs. Alma reported that:

“Many of the women, and many of their relatives who are now part of this initiative, used to go to the beach to poach turtle eggs. Now they visit the same beach, but to clean it.”

During the 2017/18 nesting season in Chacocente, 100% of the nine leatherback turtle nests were protected from poaching, resulting in the release of 137 leatherback turtle hatchlings into the sea, whereas 100% of nests were poached prior to FFI's intervention.

Additionally, Weaving for Nature has contributed to efforts to reduce the illegal targeted fishing of sea turtles at sea by increasing local understanding of their conservation importance, as well as providing fishing families with a sustainable source of income and reducing their reliance on sea turtle products. This is demonstrated by a reduction in the number of small boats known to target sea turtles in the area.

Nonetheless, there are still some challenges to overcome. FFI's sea turtle conservation programme has not completely eliminated egg poaching in the region and political turmoil has made protection efforts challenging, as well as having an impact on tourism on which the weaving group depends. However, the programme continues to provide incentives and knowledge to change poaching behaviour, and to protect nests.



Jorge Martinez-FFI

LESSONS LEARNED

Pursuing an enterprise that relies on plastic waste in order to tackle plastic pollution requires careful examination of potential social, livelihood and health implications. If appropriately considered, this type of enterprise can achieve positive environmental and socio-economic impacts, as

highlighted above. In developing Weaving for Nature, and trying to make it sustainable, a number of lessons have been learned, which we have shared here to help those planning on developing this kind of enterprise.



Alam Ramirez/FI

ENSURING THAT THERE IS SUFFICIENT MARKET DEMAND

It is important to undertake a market analysis at the enterprise design stage, to determine whether there is sufficient, and ideally growing, market demand for the products that the enterprise intends to produce. This requires engaging with a range of different market actors within the market system to ensure that demand (not supply) is the driving force of the enterprise. There are many ideas for ways in which to use plastic waste to create products, and there is a growing danger of market saturation due to increasing competition in this space. In the case of Weaving for Nature, demand is driven by tourists interested in their positive environmental impact, and so the products are distributed to tourist hubs in Nicaragua. Given the labour-intensive nature of Weaving for Nature's products, the price points are set relatively high, meaning

that international and relatively wealthy national tourists remain the only viable market in Nicaragua.

In order to increase the stability and resilience of the enterprise, weaving groups are being supported to find other outlets, particularly targeting international markets, recognising that their products may need to be adapted to respond to consumer preferences. The enterprise is now on the cusp of engaging with international clients, creating potential for expansion and diversification. Given that this will see the enterprise moving in new directions, in order to diversify its products and add value, external expertise is being brought in to draw on experiences of other highly successful initiatives, to help create products that bring something new to the market and can achieve a premium price that offsets investment.

BUSINESS PLANNING AND HIDDEN SUBSIDIES

Developing a business plan is essential for setting up an enterprise, including the critical step of determining the amount of capital required to finance the enterprise and sustain it into the future. A good business planning process identifies both fixed and variable costs, as well as initial start-up costs and longer-term investments that may be required to scale up the enterprise over time. It is important to recognise 'hidden' subsidies that can threaten the viability of the enterprise if not taken into account in the business model. In the case of Weaving for Nature, the FFI in-country coordinator's employment costs, and transport of products to market, are currently

covered by donor funding. These are effectively external subsidies that mask the true cost of operations and require incorporating into the enterprise cost structure, in order for Weaving for Nature to be truly financially viable in the long term. As such, the coordinator is currently building the capacity of group members to be able to undertake her role in the future. In addition, lessons learned with Astillero are being used to inform the work with newer groups, including through peer exchanges between groups; it is therefore anticipated that these groups will require fewer years of externally funded support than has been the case for Astillero.

ENSURING A CLEAR LINK TO REDUCING DESTRUCTIVE PRACTICES

One of the challenges associated with livelihoods initiatives is that target households may adopt a new project-promoted activity as a supplementary rather than an alternative livelihoods strategy. This can be a problem where existing strategies are environmentally damaging. In the case of Weaving for Nature, ensuring a clear link between benefitting from the enterprise and a reduction in egg poaching was ensured by: gaining a thorough understanding of the drivers of unsustainable sea turtle egg poaching (low income and poor

understanding of the conservation importance of sea turtles); using the initiative to specifically target the people whose behaviour they aimed to change (local women and their family members); and supplementing this with raising awareness among weavers, their families, and the wider fishing community about the conservation importance of sea turtles. As such, this initiative, as part of the wider sea turtle conservation programme, has successfully brought about behaviour change as evidenced by a reduction in poaching.



Alain Ramirez/FFI

AVOIDING PERVERSE INCENTIVES

It is possible that an enterprise reliant on plastic waste will need to address the challenge of perverse incentives. For instance, some producers may prefer to obtain their raw materials from sources other than waste plastic if those sources are easier to access, cheaper, better quality, require less processing or are otherwise preferable. In the case of Weaving for Nature, the enterprise reached a point where the number of plastic bags collected from beaches was insufficient to meet the demand for woven products. Additionally, the plastic bags found were not always of appropriate quality. Care needed to be taken to ensure that the enterprise did not incentivise the women to purchase plastic bags or reels of virgin plastic ribbon to meet the demand for woven products.

This was achieved by establishing the principles and strategic objectives on day one, and the groups agreeing that buying bags would not achieve the enterprise's objectives, given the importance of conservation impact. As a result, the weavers have ensured that these principles are upheld by all involved in the weaving groups. The only reported incident of a woman purchasing plastic bags resulted in the woman confessing that she had done so, and handing over the plastic bags, as she felt that she had violated her own moral code and the principles of the group. The enterprise has now established networks with local shops, family and friends to obtain more waste bags from surrounding areas, which could have otherwise ended up polluting the environment.



Alam Ramirez/FFI

CREATING DEPENDENCIES ON PLASTIC WASTE

Whilst enterprises based on plastic waste can help to reduce the amount of plastic reaching the environment, ultimately there is a global imperative to reduce our reliance on non-essential plastic products, and governments are increasingly adopting policies, such as plastic bag bans, to bring about this change. Therefore, there is a risk that enterprises reliant on the presence of plastic waste will not be viable in the long term, and thus will not achieve the desired social or conservation outcomes.

To address the fact that the plastic landscape may change in Nicaragua, resulting in plastic bags

becoming unavailable, Weaving for Nature has invested considerable support into teaching the women transferrable business skills to ensure that they can diversify markets and products. FFI is now capitalising on these skills, and supporting the weaving groups to develop other sustainable livelihood activities that utilise alternative source materials, reducing reliance on plastic waste in the long term. Some women have also used income and the skills developed through Weaving for Nature to establish other micro-enterprises, such as a small general store.



ASSESSING THE SOCIAL ACCEPTABILITY OF WORKING WITH WASTE

Millions of people make a living by working with waste – be it collecting, sorting, recycling, or developing new products through initiatives like Weaving for Nature. Although these activities contribute to the economy, can benefit the environment and provide important services, in some parts of the world there can be a stigma attached to working with waste. In many countries, efforts are being made by development agencies,

governments and the corporate sector to create safe, dignified jobs for poor people working with waste. However, local perceptions of collecting and working with waste still need to be considered when developing livelihoods initiatives, in order to ensure the social status of participants is not adversely affected, with knock-on effects for enterprise success.

MANAGING HEALTH RISKS POSED BY PLASTICS

There is currently significant discussion about, and emerging research into, the health risks that marine plastics pose to local communities, particularly those arising from toxins and bacteria. Toxins are either inherent additives or concentrated environmental pollutants that plastics accumulate in the marine environment. Bacteria of concern mainly arise from sewage outfalls and agricultural discharge. The majority of research to date has focused on microplastics, which, due to their large

surface area to volume ratio, are disproportionately able to attract high levels of pollutants from surrounding water. Based on what we know to date, it is felt that the health risks to the weaving women as a result of handling plastic bags are likely to be minimal. For more information on potential health risks associated with using plastic in livelihoods initiatives, please see the [‘Tackling plastic waste and pollution for human health and marine biodiversity – a call for action’](#) joint paper.

KEY QUESTIONS TO CONSIDER WHEN DEVELOPING PLASTIC WASTE-BASED ENTERPRISES:

- Is there sufficient market demand?
- Is the business plan feasible and has it identified all possible costs?
- How will the initiative ensure that it contributes to the desired environmental and socio-economic outcomes?
- Will there be sufficient plastic waste available for the enterprise?
- How will participants be incentivised to use only plastic waste and not new plastic?
- How will the participants' livelihoods be made resilient, in case the plastics landscape changes?
- Is it considered socially acceptable for local people to collect and work with plastic waste within target communities?
- Are there any health risks presented by using this plastic waste material, and can these be mitigated?





CONCLUSIONS

The Weaving for Nature initiative has taught us that there are a number of considerations relating to developing an enterprise reliant on plastic waste with local communities, which are essential to consider in order to establish a sustainable and viable enterprise (see Lessons Learned).

Nonetheless, if appropriately considered and managed, this type of enterprise has the potential to achieve positive environmental and socio-economic impacts. The Weaving for Nature initiative has successfully engaged a number of very remote, marginalised communities on the Pacific coast of Nicaragua, and empowered women

within these communities to collaborate to reduce marine plastic pollution and enhance sea turtle conservation, as part of a wider FFI programme of work in the region. Those involved have reported wide-ranging benefits as a result of this engagement, including apparent reductions in plastic pollution on beaches and reported improvements in livelihoods and well-being.

We hope that many of the lessons learned as a result of this initiative will be applied to subsequent projects that plan to use a similar approach in order to tackle plastic pollution.



HOW TO CITE THIS CASE STUDY

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