The Rufford Small Grants Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Nick Hill and Amado Blanco (Project Seahorse Foundation for Marine Conservation, PSF)
Project title	Seaweed farming as an alternative livelihood for conservation
RSG reference	23.10.08
Reporting period	1st January – 31st December 2009 (award granted 6th February 2009)
Amount of grant	£6,000
Your email address	nickaohill@gmail.com and amado.blanco@gmail.com
Date of this report	6th February 2010

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
a. Identify conditions when seaweed farming reduces individual's dependence on fishing			Fully achieved	All data collection was completed on time. Between June 2008 and June 2009, 3,279 household surveys were conducted across 83 households in two barangays (communities). This data has been encoded and entered into an access database, together with information from another 245 interviews that collected background information on each household.
b. Identify conditions when seaweed farming reduces the total number of fishers.			Fully achieved	Data collection from 10 communities proved more logistically difficult than anticipated, so required more time and assistance from an extra local team member. In order to meet the data collection targets in time we were not able to enter the results simultaneously. Therefore, data encoding and entry is still ongoing for this work and analyses are pending. A volunteer has been enrolled to assist with data entry, which is envisaged to be complete by the end of February 2010 and analyses will be conducted thereafter.
c. Initiate PSF planning process with community partners.			Fully achieved	As well as conducting feedback sessions and workshops with community partners in December, PSF were actively engaged in the development and mentoring of the Bohol Seaweed Farmer's Cooperative throughout the year, and we invited members of the Provincial Association of Seaweed Growers Council. PSF also convened a meeting of 10 pre-eminent Filipino marine scientists and coordinated other NGOs in Bohol in response to Provincial Government plans to develop 25,000 ha of seaweed farms. The fieldwork conducted for objectives a. and b. provided us with a very useful insight into the system that helped us with this objective and helped further develop the community links specifically with seaweed farmers in order to progress the planning process.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

The main unforeseen difficulty that arose during the project was trying to keep on top of the data entry and database management for the huge quantity of information that was being produced. Most of the fieldwork went as planned with very few problems beyond the more predictable logistical challenges of fieldwork in such remote communities. However, fieldwork for objective b. proved to be more time consuming than originally envisaged and required more time in the field where there was little access to electricity to allow data entry. To tackle the issue of the extra time required, we included an extra local team member in the Philippines for two months to assist with data collection. To assist with the data entry we have enrolled the help of a volunteer for one month.

3. Briefly describe the three most important outcomes of your project.

a. Response to governmental plans to develop 25,000 ha of seaweed farms around Bohol
In mid-2009 we learned of plans being drawn up by the Provincial Government of Bohol to develop 25,000 ha of seaweed farms around Bohol. It is very unclear as yet how this huge target will be reached, but it immediately generated considerable concern relating to socio-economic and biological impacts on Danajon Bank; our study area. Since this plan came to light, a 500-ha lease has been granted to a foreign company on Danajon Bank. The feedback sessions and community consultations that we conducted in December 2009 (objective c.) highlighted the impact of these developments on small-scale seaweed farmers of Danajon Bank. There are concerns that some people have been and will be displaced from fishing grounds and seaweed farming areas, including people from our focal communities, and that priority will be given to outside investors who can afford to pay high prices for licenses to develop seaweed farms. This obviously has a considerable impact on the people displaced and could force some people into more intensive and destructive fishing practices in an attempt to meet their livelihood needs. In response to this, Project Seahorse Foundation for Marine Conservation (PSF) has taken two steps outside of our project:

- Convened a meeting of ten pre-eminent Filipino marine scientists to formulate a set of recommendations for sustainable, ecologically sound seaweed farming in the Danajon Bank. These recommendations were presented to the Provincial Government of Bohol and have generated much interest (full statement in Appendix 1).
- Co-ordinated support from other development and environmental NGOs working in Bohol to issue a statement requesting a full moratorium on these seaweed farming developments until there is proper dialogue between the Provincial Government and local communities, and clear policies and processes are put in place.

Organising the communities and advocating for appropriate policy changes in response to these plans will form a large proportion of PSF's work in 2011.

b. An improved understanding of the nature of seaweed farming and fishing
In order for seaweed farming to be successful as an alternative livelihood to reduce fishing pressure, it must provide a better means of living than fishing. A better means of living could be interpreted as one that provides a higher income (monetary or non-monetary e.g. food), and/or is more reliable, comfortable or safe.

Preliminary analyses of information from 24 hr recall data collected as part of objective a. suggest that seaweed farming has the potential to offer returns to effort of a similar scale to fishing. These

24 hr surveys also show some negative values for seaweed farming that are likely to be due to under-sampling of rare seaweed sales events that by chance fell outside of the 24 hr recall periods. We also collected longer recall data to correct for this problem in estimating income from seaweed farming, but the negative values produced from the 24hr recall data illustrate an important difference between seaweed farming and fishing that may effect people's decision of how to allocate their time.

Fishing yields catches that can either be sold or eaten the same day as the fishing trip occurs. However, seaweed farming only yields harvest roughly two months after planting and requires some tending and guarding during that time. Some people then dry it in the sun before selling it to traders, whilst others sell it wet for a much-reduced price.

Many households therefore receive much of the benefit of seaweed farming only once every two months or so when they sell their seaweed in bulk, so the income from seaweed is not on a daily basis as it is for fishing.

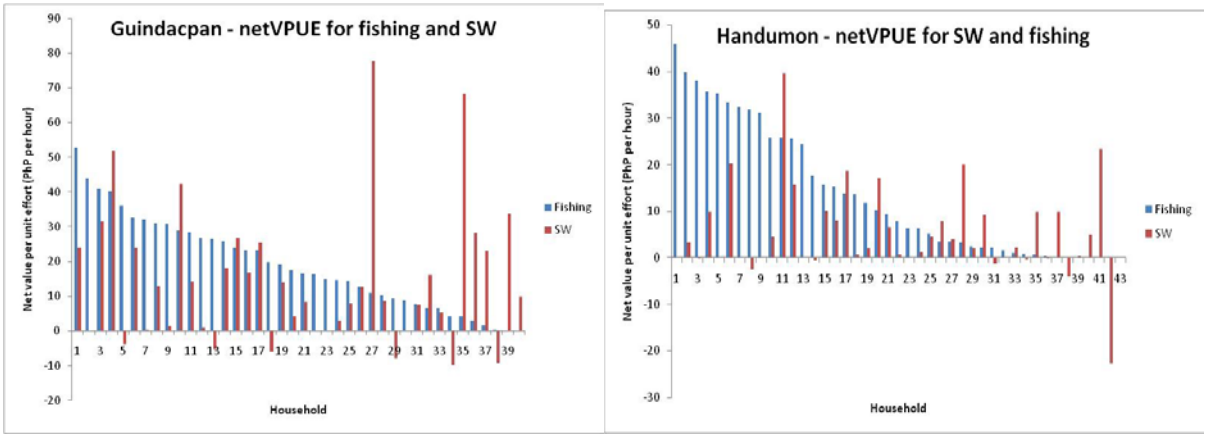

Figure 1. Net value per unit effort (VPUE) including monetary and non-monetary income (expressed as Philippine Pesos per hour) for seaweed farming and fishing by household in the barangays of Guindacpan and Handumon, Bohol, Philippines. Data collected using 24hr recall method, number of surveys per household vary from n=29 to n=47 (median = 39). These 24hr recall results show some negative values for income from seaweed farming, owing to the low frequency but high volume of seaweed sales.

The effect of the different income patterns from seaweed farming and fishing is that the two activities frequently play a different role in people's livelihoods; in many cases complementary to each other. During participatory wealth ranking sessions, fishing was reported to be primarily for the purposes of meeting subsistence needs, whilst seaweed farming was sometimes reported as being good for "jackpot" income where large quantities of income are received less frequently and could be used to improve quality of life – for example through house repairs or purchasing of appliances. This was supported in questionnaires conducted with the household respondents who were asked to score a set of answers to the question of why they are involved in fishing and seaweed farming. For the reason of "providing income for daily food and needs", seaweed farmers gave a median score of 2 (n=64) whereas fishers gave a median score of 3 (n=63, Wilcoxon Rank Sum test, $p<0.001$).

However, work conducted as part of objectives a. and b. did indicate that some households do seaweed farming and no fishing, and indeed at least two of the 10 barangays seem to be primarily

seaweed farmers with very little fishing (figure 2). The system is a very complex one, but further investigation and analysis of the unique and extensive database collected as part of this project will enable us to understand how these communities and households have managed to make the shift so completely from fishing to seaweed farming, and is furnishing us with information that we can use to help educate people on their livelihood options and how to better manage their resources. The results do indicate that seaweed farming has the potential to reduce fishing effort at an individual and community level, but this result may not be achieved unless certain conditions are met. We need to determine what these conditions are, and how we can help to facilitate those conditions. This project has provided us with the means to answer those questions and turn them into actions.

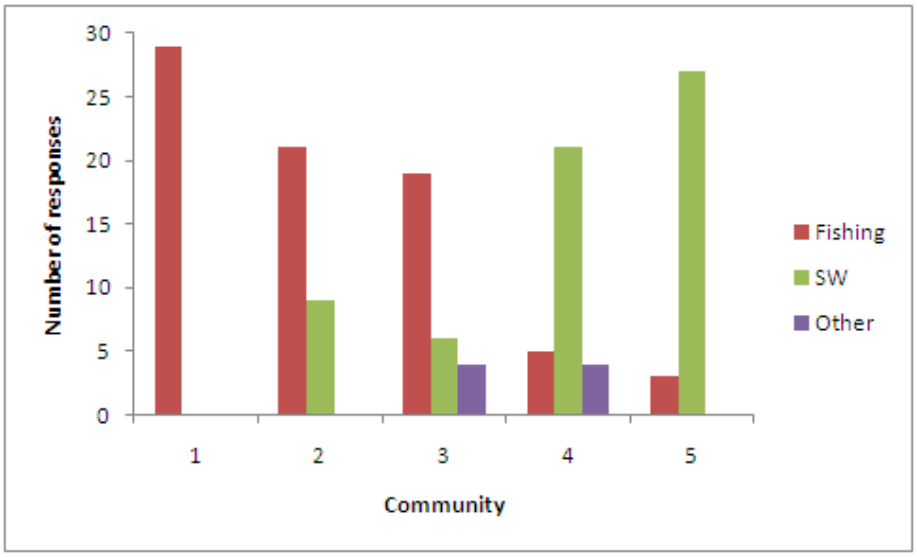

Figure 2. The primary livelihood for households from five of the ten communities studied on Danajon Bank, central Philippines. Results for the other five communities are still pending completion of data entry and analysis. 30 interviews were conducted in each community using a randomised sampling design, and in each one the respondent was asked to identify the household's most important livelihood. Livelihoods are classified into fishing, seaweed farming (SW) and others. Households' primary livelihood varies considerably between communities.

c. An improved understanding of the limitations faced by seaweed farmers.
This project has helped us to identify the limitations people face in adopting seaweed farming as a livelihood. Preliminary results from work conducted as objective b. are helping us to identify the greatest problems faced by seaweed farmers. Early results for four communities indicate the top five problems are (in descending order):

1. Weather or natural disaster (e.g. cyclones).
2. Disease of seaweeds.
3. Lack of access to capital.
4. Stealing of seaweeds.
5. Unstable price.

Although weather/natural disasters were consistently scored as the greatest problem, the order of the remaining problems was related to the community. Two of the communities rated stealing as the 2nd largest problem, and for the other two stealing was the 5th greatest problem. The reason for the difference appears to be related to the proximity of their seaweed farms to shore or a stable infrastructure such as a guardhouse built on stilts in shallow water. Anecdotal reports suggest that

some people are reluctant to expand their seaweed farming operations to the larger but more remote reefs because of the problems of stealing. In some communities, people have got around this by building guardhouses or platforms close to the seaweed area. These guardhouses give them a permanent presence to prevent thieves from stealing their valuable seaweed. But in other communities' financial resources are constraining them from doing this.

This has opened an interesting idea for us. PSF has been working for 10 years developing community-based Marine Protected Areas (MPAs) around Danajon Bank as a tool to enhance the recovery and sustainable use of Danajon Bank. One of the key tools contributing to the success of these MPAs is the construction of guardhouses from which community officials can enforce the no-fishing policy. Most of these MPAs have been on the inner reef of Danajon Bank. As there is significant interest in (and national policy for) increasing the proportion of sea protected by MPAs, we have been looking at opportunities to expand onto outer reefs further from settlements. As PSF have learnt, guardhouses are essential for MPA success, but as they are far from the communities there must be a good reason to go out to these areas. This therefore opens up the possibility of developing multi-use zones on outer reef areas and assisting communities to build guardhouses in order to guard and enforce both their seaweed areas and no-take areas. More work will be required on the biological effects of seaweed farming and how their effects (if any) on nearby habitats covered by the no-take zone could be mitigated. We would also need to look at the feasibility of developing multi-use MPAs in outer reef areas. We will monitor the recent experience of having set-up a multi-use MPA on Caubian Reef in 2009 to evaluate whether this approach can be expanded in the region.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

Working with local communities was an essential component of this work. 83 households from two barangays were involved as respondents for the whole year of the fieldwork from June 2008 to June 2009 as part of objective a. A further 300 households from 10 communities were interviewed as part of objective b. Barangay (community) captains, officials, People's Organisations and MPA Management Councils (where relevant) where all involved through a combination of feedback sessions, consultations and participatory research methods. As much of this phase of the PSF Seaweed Farming and Ecosystem Programme is about gathering information on which to base future interventions, the main benefit to these people and communities came in the form of an opportunity and forum for expressing their concerns with the sustainability of seaweed farming and fishing, and for us as part of a NGO to better understand the challenges they face. As such we have already started developing some advocacy at the level of Provincial and Municipal Government and helping to give them a voice (for example 3.a.). This may not yet have led to solid results for them, but without the work we conducted they may not have had this opportunity.

Other benefits to the local communities include four local team members who were employed from communities covered by this project. Through the project and experiences in the different communities, they have learnt much about seaweed farming and been able to share their experiences with their communities.

5. Are there any plans to continue this work?

Yes. Nick Hill will continue to work on the results obtained from the data collected as part of objectives a. and b. in order to better understand the relationship between seaweed farming and fishing, and to further develop management recommendations. He will continue this as part of his

PhD studies, for which he has funding from the Economic and Social Research Council. Results will continue to be fed into PSF's work. Reports and papers that arise from the work conducted as part of this project will also be forwarded to Rufford Small Grants and the contribution acknowledged, and results will be fed back to local communities and partners (see 6.).

PSF will continue with the Seaweed Farming and Ecosystem Programme. In 2009, Amado Blanco resigned as National Director of PSF, and has recently been replaced by a new National Director, Mr Buenaventura Maata, who started in January 2010. Mr Maata has a background in working for NGOs that implement livelihoods, including seaweed farming, so has interest and expertise in continuing this work with PSF. He is currently working on the development of the new Strategic Plan for PSF for 2011 to 2013. Seaweed farming will form an important component of this strategic plan due to the Provincial Government plans for expansion and the potential socio-economic and biological impacts.

PSF will continue to advocate on behalf of the local communities in response to the planned expansion and foreign investment in seaweed farming in the area. This was highlighted as a major issue during the community consultations conducted as part of this project. There is also a need to help communities organise themselves better so that they can respond to these problems. This was highlighted during the Small-Scale Seaweed Farmers' Congress that PSF ran jointly with provincial and municipal levels of government and responsible line agencies in June 2008. Following this Congress, the Bohol Seaweed Farmer's Cooperative was established, but it requires further fostering and the development of local chapters. Given PSF's experience in developing the Alliance of Small-Scale Fishers of Danajon Bank (KAMADA), we are well positioned to assist with this.

The biological effects of seaweed farming are poorly understood, so more research is required to understand how these expansions are likely to impact on the marine biodiversity and ecosystem services. This was highlighted by the meeting that PSF convened of ten pre-eminent Filipino marine scientists in response to the Provincial Government plans to develop 25,000 ha of seaweed farms (for the statement resulting from this meeting see Appendix 1). A new PhD student, Mr James Hehre, has started with Project Seahorse based at the University of British Columbia, Vancouver, Canada, who will be focusing on this issue.

6. How do you plan to share the results of your work with others?

Within the context of Danajon Bank, we conducted feedback sessions with our respondents and the barangay officials once every three months. PSF also regularly hold consultation sessions, briefings and feedback sessions with community and government partners at which results of our work are shared.

At a wider level, updates of our work are provided in Project Seahorse newsletters and Annual Reports that are widely disseminated and available on the web (www.projectseahorse.org). Nick Hill will produce a PhD thesis by the end of 2010. The chapters of this will be published as papers that will be available to the scientific community, and will be accessible through the Project Seahorse, ZSL and Imperial College Conservation Science websites. These chapters will also be summarised as management briefings that will be disseminated around PSF's partners in the Philippines, at community, municipal and provincial levels. He will also give presentations on this work at the Student Conference for Conservation Science (SCCS) in Cambridge in March 2010 and at the Institute of Zoology, Zoological Society of London and Imperial College London in the coming months. He is submitting an abstract to the Society for Conservation Biology annual meeting that will be held in

Edmonton, Canada in July 2010. He has already given presentations at the University of British Columbia and Simon Fraser University in Vancouver, British Columbia, Canada on this work.

7. Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?

The RSG funding was used from February to December 2010, and within the anticipated length of the project.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

The original application and budget was made when the exchange rate was around PhP80: £1. Unfortunately, there was the global financial crisis soon after the application was made, and when the funding was received the exchange rate was significantly lower. The exchange rate used is based on the overall rate received, which was **PhP74.78: £1.** Many of the positive differences below are due to the reduced exchange rate.

Item	Budgeted Amount	Actual Amount	Difference	Comments
International flights	1,923	2,244	321	No extra flights, but there was an increase in flight surcharges during the time.
Visas	172	285	113	Main addition was the cost of visa extensions in the Philippines. More time was spent by N Hill in the Philippines than originally planned, and the drop-in exchange rate inflated the price.
Local travel	1,000	884	-116	Although the price of transport rose, we managed to reduce travel costs as far as possible by economising on trips and careful planning.
Stipends for local research assistants	5,743	6,274	531	An extra local research assistant was employed for 2 months which accounted for part of it, and the remainder was due to drop in exchange rates following the credit crunch.
Field accommodation	900	923	23	On budget.
Subsistence	625	794	169	Mainly due to the drop-in exchange rate.
Stationery and printing	400	207	-193	Over-estimated.
Communication	200	150	-50	Over-estimated.
Equipment	1,500	1,469	-31	On budget.
Small-scale seaweed farmers congress	2,000	2,000	0	On budget.

PSF community feedback and planning sessions	440	450	10	On budget.
KAMADA workshop	250	260	10	On budget.
Dissemination of results	200	0	-200	We have conducted feedback sessions, but we have not yet disseminated hard copies of the final results, which will be done following further analytical work.
TOTAL	15,353	15,940	587	

9. Looking ahead, what do you feel are the important next steps?

The important next steps are:

1. Advocacy work to support the interests of local communities in the face of the proposed expansion and foreign investment in seaweed farming.
2. Assess the biological impacts of seaweed farming, and methods for mitigating these impacts.
3. Develop multi-use MPAs on outer reef areas that incorporate strict no-take zones and nearby seaweed farming areas.
4. More detailed analysis of information collected during this project.
5. Final feedback to local partners and communities of detailed results and analyses from this project once complete in the form of management summaries (see 5. and 6.)

10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

Yes. RSGF logo has been used in the acknowledgement sections of all presentations made by Nick Hill in Vancouver, UK and Philippines, and will continue to be used in upcoming presentations (see 6.). RSGF will also be recognised in the 2009 Project Seahorse Annual Report (to be published 2010 and available online) and 2009 ZSL annual report. Copies of these reports will be forwarded to RSGF. We also recognise RSGF's support on the Project Seahorse and Imperial College Conservation Science (Nick Hill's page) website.

11. Any other comments?

Thank you very much to the Rufford Small Grants and to Jane Raymond for your fantastic support for this project. Thanks also to the Economic and Social Research Council; Royal Geographical Society with IBG; the Institute of Zoology, Zoological Society of London; and the Zoological Society of London Field Conservation Grant for their generous assistance. We would also like to acknowledge the invaluable role that the PSF team members played in this project, especially Franco Villaruel, Angelie Nellas, Perfecto Auxilio and Lourdes Labrada. Four essential people were our Local Research Assistants who did a fantastic job; Hermes Cosicol, Noel Vitor, Gerry Sucano and Cilo Minguito – daghang salamat. Thanks also to Nick Hill's PhD supervisors who provided scientific advice and support – Professor EJ Milner-Gulland (Imperial College London), Dr Marcus Rowcliffe (Institute of Zoology, Zoological Society of London) and Dr Heather Koldewey (Associate Director of Project Seahorse, Zoological Society of London). Last but not least, the greatest thanks go to the barangay captains, kagawads, officials and of course the respondents and interviewees who opened their doors to us and made the team feel very welcome wherever we were. These barangays included Handumon (Getafe), Guindacpan (Talibon), Bilangbilangan (Tubigon), Batasan (Tubigon), Cuaming

(Inabanga), Hambungan (Inabanga), Alumar (Getafe), Mahanay (Talibon), Bilangbilangan East (Bien Unido) and Hingutanan East (Bien Unido). Daghang salamat tanan!

APPENDIX 1.
RECOMMENDATIONS FOR SUSTAINABLE SEAWEED FARMING IN DANAJON BANK

In response to the planned 25,000-ha expansion of seaweed farming area in Danajon Bank, the Project Seahorse Foundation for Marine Conservation convened a one-day consultation participated in by scientists of various relevant disciplines in marine science. They reiterated that planning, siting, and operating seaweed farms and expansion to other areas in the country should be cognizant of long-term sustainability, impact to sensitive marine habitats, and compatibility with other coastal users/uses.

These principles can be promoted by considering a set of technical criteria, albeit at this stage preliminary. These include the culture requirements of the seaweeds to be farmed, the presence of other important habitats and ecosystems in prospective seaweed farming sites, the environmental effects of seaweed farming, the interaction of mariculture activities with other (possibly conflicting) uses of the culture areas, and the advantage of a management body to oversee the farming activities and practices at the site level.

Based on information at hand on the environmental effects of seaweed farming, and the status of resources and their utilization in Danajon Bank, the scientists make the following recommendations to the provincial government of Bohol:

1. That seaweed farms should not be established over coral reefs and seagrass beds; and mooring and anchoring structures should not be attached to corals;
2. That good sea water quality should be maintained at farm sites to serve as indicator that the farms do not exceed environmental carrying capacity (farming intensity and volume of seaweeds that the environment can support);
3. That social services such as waste disposal, education, and health should be provided to the expected human settlements for the seaweed farms;
4. That an environmental management body should be developed by enhancing existing bodies like the Coastal Law Enforcement Council (CLEC), and said body should have monitoring and research-related responsibilities in partnership with academe;
5. That future expansion of the seaweed industry in Bohol should consider areas outside Danajon Bank because of the high turbidity and lower current speeds in its western portion. Moreover, Danajon Bank is likely to be nominated as National/World Heritage site because of its uniqueness as one of only four double barrier reefs in the world, and the only one in the Philippines; and
6. That the total potential area for seaweed farm expansion in the Bohol part of **Danajon Bank is 7,857 ha** based on water depth of 15 meters (see attached map). A reserve area for coral reefs and seagrass beds should be set aside equivalent to 15% of total area, as mandated by R.A. 8550 or the Fisheries Code. The potential farm areas under the jurisdiction of the provinces of **Leyte and Cebu are 5,754 ha and 3,703 ha, respectively**.