

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	Annisa Satyanti
Project title	An impact assessment of limestone quarries on flora diversity in Ciampea, Bogor, Indonesia
RSG reference	46.06.08
Reporting period	June 2008 – Dec 2009
Amount of grant	£5454
Your email address	a.satyanti@gmail.com
Date of this report	May 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
Collecting data, identifying plant species and microhabitat/ ecology			Yes	We could not find a completely non-quarried site. However, we decided to do the survey for intact vegetation at the remnant intact forest on a quarried limestone hill.
Listing endemic, rare and key plant species		Yes		We found that the endemic species of terrestrial orchid <i>Zeuxine tjiampeana</i> cannot be seen anymore in the study area. The Herbarium Bogoriense latest record was reported by J.J. Smith in 1909. As the survey did not reach many microhabitat/ patch and the access is difficult we felt that we did not able to elaborate all species inhabiting the limestone hills.
Collection for ex-situ conservation at the botanical garden			Yes	The collections were recorded and are now maintained in the nursery at the Bogor Botanical Garden.
Identifying potential native species for restoration		Yes		So far, we have tested <i>Ficus fistulosa</i> under competition with <i>Tridax procumbens</i> that commonly invade abandoned quarries. However, there were still many limestone species potential for quarry restoration to be tested.
Information of limestone flora in Java (particularly for Bogor region)			Yes	We have submitted one paper in an international journal about the flora surveyed from the two limestone hills.
Publication			Yes	Two scientific papers in international and national journals; poster presentation at CBD COP meeting in Nairobi (10-21 May 2010). Presentation about result was also carried out at staff meeting on 26 March 2010

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

The remaining intact vegetation that can be used to encompass original or native flora was located on top of the hills, and was difficult to be accessed. Hence, vegetation analysis was somewhat limited. Local community, including quarry workers, did not pay much attention about the vegetation study as they were busy digging and carrying lime stones. We gathered several

specimens to be planted for ex-situ conservation in the botanical garden. We collected also plant materials for herbarium.

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

- List of flora and structure of vegetation on limestone hills in Bogor (Java) as there has been no study since earlier observation by van Steenis in 1930. Endemic species reported previously seems to be extinct.
- Increased collection at Bogor Botanical Garden, particularly for limestone species.
- Potential ability of *Ficus*, a key species that is expected to be advantageous in such environment, in restoring the habitat is still questioned. Thus, a search on other potential species is needed.

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

Prior to the vegetation analysis, we frequently met and talked to the people, mostly workers of quarries, canteen keepers, or local villagers looking for firewood. I was surprised to find their dependency to the limestone hills, regardless their understanding on the environmental degradation that is caused. In Nyungdung remaining forest, according to the locals, many people still come to search for medicinal plants in the forest. However, they were not involved directly during the floristic survey.

5. Are there any plans to continue this work?

Yes. We plan for further research on seed ability to regenerate on quarried over area (bare limestone soil) is fundamental, especially for species with narrow edaphic niche on limestone.

Actually, we are also planning to re-search the *Zeuxine tjiampeana*, endemic species, in Ciampea limestone hills, and to gather living collection of medicinal plant species in Nyungdung limestone hills. It is very prominent work as the quarry activities is still on going and even at higher pace.

However, as acquaintance with this species hardly existed, we consider that this is not very feasible.

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

We plan to produce two scientific papers to be published in renowned international and national journals. The first paper on ecological study, floristic composition of two limestone hills has been submitted to BIOTROPIA, an accredited South East Asian journal on tropical biology. Another paper on restoration ecology, species selection and competition is being written and is planned to be submitted to a national journal. Talks (oral and poster presentations) about the results will be delivered in seminars and scientific meetings.

We had discussions with WWF Indonesia about limestone conservation project they supported, and he referred to an activity held by students of Forest Conservation Department, Bogor Botanical Garden in Bantimurung- Bulusaurung National Park, South Sulawesi that was funded partly by WWF-USA. We also had a discussion with Dr. Cam Webb from Arnold Arboretum Harvard University about plant diversity on limestone.

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

June 2008 - December 2009 was the planned time period, but the activities extend until March 2010 with validation of plant identification results, study on germination and survival of *Ficus fistulosa* on quarried over soil, data analysis, and preparation on scientific papers.

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.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Office	450	200	+ 250	We mainly spent for printer ink and telecommunication (phone)
Fieldworks	1795	1745	+ 50	This includes allowances for team working in the field.
Equipment	1852	1295	+ 557	We did not buy all proposed equipment. The existing equipment from the institute is used, as we need to allocate more for other slot.
Plant material collection (ex-situ conservation) and in house research	461	925	- 464	Per diem for greenhouse/ lab assistant increased as the duration of experiment was lengthened.
Data analysis and plant identification	250	550	- 300	We needed to hire a plant specialist (taxonomist) for plant identification. The number of specimens was larger than what is expected, and validation was also carried out.
Report and result dissemination	646	750	- 104	
TOTAL	5454	5464		

Assumed rate 1£= IDR 11 850

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

1. Seed ecology of limestone is required to be further investigated. Seeds of many species inhabiting limestone, particularly species with narrow distribution should be tested with respect to its germination and determining factors. This will contribute in determining restoration effort in limestone.

2. We aim to gather more living specimens for ex-situ conservation at Bogor Botanical Garden as species living in limestone environment tend to have special characters compared to the same species occurred in less extreme environment, and species endemic to limestone.

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, I used the RSGF logo in both presentations and the source of funding was mentioned elsewhere as appropriate. The RSGF will be officially acknowledged in the publication currently being prepared.

11. Any other comments?

The Rufford Small Grant that I received played a vital role in the success of this project. Without the financial support gained from the grant the research would not be able to be done, and the lack of information of limestone flora in Indonesia especially in Bogor would remain.



CLIMATE CHANGE AND QUARRIES IMPACT ON FLORISTIC COMPOSITION

CASE STUDY OF VEGETATION ASSESSMENT ON LIMESTONE HILLS IN BOGOR, WEST JAVA

Study Objectives
 • Conduct a floristic survey of limestone hills in Bogor, West Java, Indonesia.
 • Assess the impact of quarrying and climate change on the floristic composition of limestone hills in Bogor, West Java, Indonesia.
 • Publish the Rufford Small Grants Foundation logo.

Climate change leading to predicted dry season and warmer climate will affect the sensitive flora of limestone.

Limestone species and other soil-restricted taxa, that mostly endemic, may be presumed to face an extremely high risk from climate change because their narrow range-restricted taxa that possibilities to adapt through migration.

Regularly monitoring programs to understand the effects of climate change on the hills and to be able to adjust management and conservation accordingly to fundamentals.

Study sites: Gunung Rajur Complex (100° 41' 30" E and 06° 33' 00" S) and Gunung Nungjung (100° 38' 00" E and 06° 31' 00" S). The two sites were already quarried since 1980s.

The dominant families in Nungjung were Euphorbiaceae, Myrtaceae, Sapotaceae, and Moraceae whereas in Complex, they were Euphorbiaceae, Sapotaceae, Anacardiaceae, and Rutaceae. In both sites it can be observed that Euphorbiaceae and Moraceae were dominant. *Antidesma montanum* is the most important species encountered in Nungjung, whereas *Morinda javanica* was the most of in Complex.

The origin of floristic composition reported by van Steenis in 1971, i.e. *Dipterocarpaceae* forest, *Dioscoreaceae* forest, and a number of *Dioscoreaceae* species (*Dioscorea* and *Synedrella*) 1971 were hardly found in the area at present. Only a species of *Albizia*, *Dioscorea* can still be found.

Dioscorea ganessiana Poir. is confirmed to be a species by Dumbler (1992) in Complex limestone area. The species was not found in the two hills.

New species of *Dioscorea* sp. nov. was reported as a new species. Other species, initially endemic, were still probably to be occurred as all mountains on the hills have not been surveyed.

The number of flora records in the two limestone hills exceeds 100 species which belongs to several potential species endemism.

Limestone ecosystem is an example of ecosystem facing multi threats including anthropogenic, natural climate change.

A more intensive floristic survey could be conducted to assess the status of its species extinction, together with an effort for ex-situ conservation.

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