UN Environment

Terminal Evaluation of the UNEP/GEF Project "BIOCHAR FOR SUSTAINABLE SOILS B4SS" (GEF ID: 5824)

Dr Justine Braby (Evaluation Consultant)
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For further information on this report, please contact:

UN Environment Evaluation Office:
Email: eou@unep.org
Website: https://www.unenvironment.org/about-un-environment/evaluation

(Biochar for Sustainable Soils – B4SS)
(5824)
(August/2019)

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The evaluator would like to express her gratitude to all persons met and who contributed to this evaluation, these persons are listed in Annex 2.

The evaluator would also like to thank the project team and in particular Ersin Esen (UNEP Task Manager) and Ruy Anaya de la Rosa (Project Director, Starfish Initiatives) for their contribution and collaboration throughout the evaluation process. Special thanks go to the Scientific Advisory Panel members who provided their very useful insights. Country coordinators were extremely helpful in enriching the insights into this evaluation and were highly responsive. For the country visits, special thanks go to Berhanu Belay and Milkiyas Ahmed in Ethiopia, Xiaoyu Liu and Genxing Pan in China, and Mai Thi Lanh Anh in Vietnam who were most gracious hosts and extremely supportive in coordinating and facilitating the country missions. All farmers and stakeholders interviewed and met are thanked, particularly those who warmly welcomed the evaluator into their home. Particular thanks go to farmers Ibrahim Aba Fita of Ethiopia and Le Thu Luan of Vietnam for championing biochar on their farms and inspiring the farmers in their countries.

The evaluating consultant hopes that the findings, conclusions and recommendations will contribute to the successful finalisation of the current project, biochar integration of projects to come and to the continuous improvement of similar projects in other countries and regions.

ABOUT THE EVALUATION

Joint Evaluation: No

Report Language(s): English.

Evaluation Type: Terminal Evaluation

Brief Description: This report is a terminal evaluation of a UNEP/GEF Medium-Sized Project implemented between 2015 and 2018. The project's overall development goal was to demonstrate and promote the adoption of Sustainable Land Management practices involving the use of innovative organic amendments, based on biochar, that improve the capture and efficient use of nutrients, and enhance productivity, improve climate resilience, support rural livelihoods, and contribute to watershed management. The evaluation sought to assess project performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability. The evaluation has two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UN Environment, the GEF and the relevant agencies of the six project participating countries (Indonesia, Vietnam, China, Ethiopia, Kenya, Peru).

Key words: biochar; sustainable land management; SLM; agriculture; soil; soil amendment; innovation; farmer; soil fertility; crop yield; scientific integrity; food security; climate change.

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LIST OF ACRONYMS

APRODES	Peruvian Association to Promote Sustainable Development
BD	Biodiversity
CC	Climate Change
DEPI	Division of Environment and Policy Implementation
FAO	Food and Agriculture Organisation
FMO	Financial Management Officer
GEF	Global Environmental Facility
IBI	International Biochar Initiative
ICRAF	World Agroforestry Centre/International Centre for Research in Agroforestry
ISRI	Indonesia Soil Research Institute
LD(N)	Land Degradation (Neutrality)
NAU	Nanjing Agricultural University
NGI	Norwegian Geotechnical Institute
NRM	Natural Resource Management
NSW DPI	New South Wales Department of Primary Industries
ParTriDev	Participatory Trial Design
POW	Programme of Work
SDGs	Sustainable Development Goals
SLM	Sustainable Land Management
TNUS	Thai Nguyen University of Sciences
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme

PROJECT IDENTIFICATION TABLE

Table 1: Project summary

GEF Project ID	5824	**GEF approval date:**	22 May 2014*
GEF Project Type	MSP	**Executing Agency:**	Starfish Initiatives (Starfish Enterprises Network Limited
Sub-programme:	Ecosystem management		
GEF Focal Areas	**LD1: Outcome: 1.2**: Improved agricultural management. **Outputs: 1.2.** Types of innovative SL/WM practices introduced at field level; **1.5**: Information on SLM technologies and good practice guidelines disseminated. **LD4: Outcome: 4.2:** Improved GEF portfolio monitoring using new and adapted tools and methodologies, **Outputs: 4.2**: GEF-financed projects contribute to SLM/SFM/INRM knowledge base.		
Expected Accomplishment(s):	POW 2015-2016: EA (a): Use of the ecosystem approach in countries to maintain ecosystem services and sustainable productivity of terrestrial and aquatic systems is increased by (2): Tools, technical support and partnerships to improve food security and sustainable productivity in agricultural landscapes through the integration of the ecosystem approach.		
PoW Output(s):	Programme of Work (2015- 2016)		
Coverage - Countries:	China, Ethiopia, Indonesia, Kenya, Peru, Vietnam	**Coverage - Region(s):**	Global
Expected Start Date:	22 July 2014***	**Actual start date:**	13 April 2015** 14 April 2015***** (Inception Workshop)
Planned completion date:	30 April 2017	**Actual completion date:**	31 December 2018**
Total budget of project at approval:	USD 3,607,454**	**Total expenditure reported as of April 2018:**	USD 1,140,583**
GEF contribution at approval:	USD 1,826,484**	**First disbursement:**	9 February 2015
Expected co-financing:	USD 1,257,800**	**Planned project duration**	3 years
Secured co-financing:	USD 1,780,970****	**Date of financial closure:**	TBD
No. of revisions:	0**	**Date of last revision:**	n/a
		Mid-term review/ evaluation (actual date):	Internal 8-10 March 2017******
Date of last Steering Committee meeting:	9 March 2017	**Terminal Evaluation ((planned) actual date):**	(October – December 2017***) May – November 2019

Sources for Table 1:

Evaluation TOR

* GEF CEO Approval Letter

**Evaluation TOR

***Project Supervision Plan (Excel Sheet)

**** Final Co-Financing Report (2018)

***** Inception Workshop, 14 April 2015, Nanjing, China

****** Mid-Term Workshop and Project Review Report, Thai Nguyen, 8-10 March 2017

EXECUTIVE SUMMARY

Background and Methods of the Evaluation

1. Given the rates of land degradation globally and the interconnectedness between agricultural transformation and achieving the Land Degradation (LD) indicators for sustainable food security, it has become imperative to socially disperse Sustainable Land Management (SLM) innovations as quickly as possible.

2. The "Biochar for Sustainable Soils" project (B4SS) aimed to build on existing foundations by evaluating the diverse formulations and applications rates of biochar (as one type of SLM innovation) for different scenarios of soil types, climates and agricultural systems. It also aimed to connect those who have strong scientific expertise with those who have strong capacities for rural agricultural extension, and focused on six countries: Indonesia, Vietnam, China, Ethiopia, Kenya and Peru.

3. As a GEF Medium-Sized Project, the project was developed in the context of the Land Degradation Focal Area, most notably, LD 1 Outcome 1.2. Improved agricultural management. In the context of UNEPs' Medium-Term Strategy (2014-2017), it contributed to the Programme of Work 2015-2016 under Expected Accomplishment EA (a) "Use of the ecosystem approach in countries to maintain ecosystem services and sustainable productivity of terrestrial and aquatic systems is increased by (2) Tools, technical support and partnerships to improve food security and sustainable productivity of agricultural landscapes through the integration of the ecosystem approach".

4. The project was implemented through the UNEP Ecosystems Division. Starfish Initiatives were the Executing Agency, and country level implementation was devolved to specific and appropriate institutions.

5. The intended duration of the project was three years, although a late start and other delays meant that it was extended by eight months (April 2015 – December 2018). The total project cost was USD 3,084,282 (of which USD 1,828,484 was GEF allocated, and USD 1,780,970 was co-financed).

6. In line with the UNEP Evaluation Policy and the UNEP Programme Manual, as well as the updated guidance for evaluators (developed by the Evaluation Unit), the Terminal Evaluation of the B4SS Project (Sharing knowledge on the use of Biochar for SLM/Biochar for sustainable soils) was undertaken to assess performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability. As per the Terms Of Reference, the evaluation has two primary purposes:

    i. To provide evidence of results to meet accountability requirements, and

    ii. To promote operational improvement, learning and knowledge sharing through results and lessons learned among UNEP and its project partners (Starfish Initiatives, and country partners).

7. Aligned to the UNEP Evaluation Guidelines, the project was assessed with respect to a minimum set of evaluation criteria grouped into nine categories: Strategic Relevance, Quality of Project Design, Nature of External Context, Effectiveness, Financial Management, Efficiency, Monitoring and Reporting, Sustainability and Factors Affecting Project Performance.

8. A Theory of Change was reconstructed at the Inception Phase and was based on extensive desktop reviews and revisions together with project stakeholders.

9. The strategic questions set out for the evaluation, as set out in the evaluation Terms of Reference (TOR) were:

a. To what extent have the good practice guides on SLM technologies been disseminated in each participating country (linked to Outcome 2)?

b. To what extent are the project design, (reconstructed) Theory of Change, and results framework suited to a project that encompasses six pilot interventions? Specifically, what evidence exists to suggest that the results, lessons and experiences generated by the pilot projects are ready to be scaled up or replicated either within the implementation countries, or in new target areas?

c. What has been the degree and effectiveness of partnership collaboration with stakeholders? Are partner countries' government officials aware of the project outcomes? What are the opportunities to engage with more stakeholders? (related to Stakeholder Participation and Country Ownership – Factors affecting performance)

d. To what extent was a customized gender sensitive approach adopted for selecting and/or involving fe/male farmers and researchers? What effect did this have on the project outcomes, if at all?

The Project Context

10. The project objective was to "demonstrate and promote the adoption of SLM practices involving the use of innovative organic amendments, based on biochar, that improve the capture and efficient use of nutrients, and enhance productivity, improve climate resilience, support rural livelihoods, and contribute to watershed management".

11. Key stakeholder groups included: (a) farmers and users of biochar, (b) national experts, scientists and researchers, (c) international experts and scientists, (d) local government, (e) students and upcoming researchers/scientists.

Theory of Change at Evaluation

12. The evaluator had to reconstruct a Theory of Change in lieu of its absence in project development (this was not a prerequisite during the time of project development, thus no Theory of Change was developed during design). The Theory of Change diagram can be found in Figure 3 of this report.

13. The final, long-term, impact(s) of the Theory of Change is that the project (beyond project closure and in the long-term) supports movement towards the mainstreaming of biochar application in relevant areas and as appropriate, to further improve SLM and soil productivity. This will further improve the health and resilience of the soil, watersheds, and ultimately, the rural livelihoods.

14. Analysis of the impact pathways was conducted in terms of the assumptions and drivers that underpin the processes in the transformation of outputs and outcomes to intermediate states to impact. Generally, the intermediate states are a result of the increasing knowledge base of knowledge through field testing, as well as the increased general understanding of the role of biochar in enhancing soil productivity, particularly among farmers, as well as its use and application in many farm-related settings. This should lead to greater uptake and use of biochar in the six countries, and also in other countries.

Evaluation Findings (see Ratings Table in Conclusions and Recommendations**)**

Strategic Relevance

15. The project was highly relevant to the UNEP Medium-Term Strategy and subsequent POWs, as well as to the Global Environment Facility 5th phase (GEF-5). The project was also highly relevant and demand-led in the six countries. The rating for Strategic Relevance is *Highly Satisfactory*.

Quality of Project Design

16. The project was generally well-designed, especially with regard to country-level implementation. Given the complexity of the project, the project governance and coordination was well-laid out, including in its planning around, partnerships, financial management and budgets, sustainability and replication. Country-level capacity assessments would have improved some aspects of project implementation if it had been done at design. Quality of Project Design is rated *Satisfactory*.

Nature of External Context

17. Generally, in terms of external context, risks were low in all six countries. There was no likelihood of conflict in the countries. The only risk that was highly appropriate to this country, but was covered and mitigated for in the design, was that field sites, and thus results, would be affected by environmental disasters. In some cases, flooding and pests did hamper field site experiments, but this did not significantly affect project results. The rating for Nature of External Context is *Favourable.*

Effectiveness

Delivery of Outputs

18. Output 1.a. Collation of demonstration results in comparing biochar with alternative mismanagement practices: Overall, biochar was compared with alternative management practices in 13 demonstration sites across six countries (versus the envisaged 6 sites planned at design).

19. Output 1.b. Evaluation of a range of formulations and application rates of nutrient-enhanced biochar: As many as 34 different formulations of biochar were tested and these were aligned to country contexts. The project outperformed the output-level indicator, because the target at design was 24.

20. Output 1.c. Collation of recommended practices for the use of biochar in SLM: Strong development and dissemination of communication and information materials was affected in all six countries, and internationally, through various channels.

21. Output 2.a. Guidelines for the use of biochar in SLM: Good practice guides were developed and disseminated at global and country–level. A video was developed of the project in general, and at country level. The Participatory Trial Design (ParTriDes) methodology was also put together as a guide and is freely available on the project website.

22. Output 2.b. Networks of demonstration sites and farming groups: It was evident from the evaluation findings, that networks and professional relationships were one of the most productive and successful results of the project. At international level, the project strengthened some elements of the International Biochar Initiative and supported the launch of the Africa Biochar Partnership. The project further strengthened and connected country-level scientists with international scientists. Another loose network that developed was upcoming biochar scientists and their link to senior, international biochar experts.

23. Output 2.c. Smallholders, farmers, resource managers, development agents, agricultural extension staff, researchers, B4SS project members, producers of biochar-making ovens, and university students are trained in the production and use of biochar as a soil amendment: The project vastly outperformed on this output (from a target of 36 people to be trained as per project design logframe, the project ended up training 661 people). Various international and national trainings took place. In addition to the many country-level trainings, capacity was also developed within project partners, as well as upcoming students and scientists.

24. Delivery of Outputs is rated as *Highly Satisfactory*.

Achievement of Direct Outcomes

25. Outcome 1: Increased understanding of the potential of biochar in improving productivity and addressing issues of declining soil fertility and mismanagement of resources: As per the logical framework indicator for this outcome, the final project report showed that 205 farmers participated in the evaluation of the effects of biochar (versus the target of 120 at project design). There has been an evidenced increase in the understanding of the benefits of biochar. The project certainly helped to drive enhanced use and access to biochar through strengthening of the farmer-local scientist and local scientist-international scientist networks. This resulted in co-learning for uptake.

26. Outcome 2: Knowledge generated and disseminated on the appropriate use of biochar to improve the capture and efficient use of nutrients, while reducing air and water pollution; and increased awareness and improved management amongst stakeholders on the use of biochar to address soil constraints, and most effective application rates and formulations to achieve agronomic benefits: The target for the outcome-level indicator at project design was 120. The project outperformed 10-fold by training and/or exposing 1042 people to biochar. The project vastly outperformed in the amount and quality of communication and outreach materials. Most project proponents especially highlighted the value of the knowledge sharing between countries and the support by the Scientific Advisory Panel. This outcome, as achieved through the project, will lead to the intermediate state (of the Theory of Change) that more informed farmers and users are able to make, and use, biochar for application.

27. Achievement of Direct Outcomes is *Highly Satisfactory*.

Achievement of Likelihood of Impact

28. The likelihood of achievement of overall impact, in the long-term, as a result of project outcomes achievement and causal pathways in the reconstructed Theory of Change, will vary from country to country, and depend on some assumptions being met.

29. It was found though that two elements are key in understanding how the project might eventually reach impact in the long-term, namely (1) level of championship among farmers, local and international scientists, and (2) the social dynamics in the countries in question, particularly as economies grow and farming becomes “less desirable” and traditional behaviours and their openness to change.

30. Overall, the project did well to achieve its outcomes, and all it could do to move to impact, but there are some external social considerations that the project does not have control over that will affect the eventual move to impact. Those under the project’s control, the evaluator is confident the project respondents are able to continue to support in the wider SLM landscape.

31. Achievement of likelihood of impact, as directly connected to what the project is able to control, is *Highly Likely*.

32. Rating for Effectiveness is *Highly Satisfactory*.

Financial Management

33. Completeness of Project Financial Information: The project’s financial management is as complete as it can be within the requirements of financial reporting for the time period it was in. Co-financing was reported in detail. There was a slight revision to the budget in 2016, but this was minimal and did not affect project implementation. Completeness of financial information is rated as *Highly Satisfactory*.

34. Communication between Finance and Project Management Staff: Communication between the relevant parties was regular. A no-cost extension was made for the project. Financial delays were experienced by the project, mostly because of the Umoja transition. This could have been better communicated with the project Executing Agency. Rating for Communication is rated as *Satisfactory.*

35. Rating for Financial Management is *Highly Satisfactory.*

Efficiency

36. The project was able to achieve much more than anticipated – especially given the limited time and funds. The project was highly cost-effective. Some delays could have been avoided with better project planning. Efficiency is rated as *Satisfactory*.

Monitoring and Reporting

37. Monitoring Design and Budgeting: This was generally well done at design, although the outcome-level indicators were not appropriate for outcome-level (which necessitates a deeper, more nuanced indicator, e.g. change in behaviour). Rated as *Satisfactory*.

38. Monitoring of Project Implementation: The monitoring was conducted as laid out by the project document, but was further improved on. Continuous learning and the Mid-Term Review workshop helped a lot to sharpen and focus the project results attainment. Rated as *Highly Satisfactory*.

39. Project Reporting: Half-year progress reports were developed throughout the project lifespan. The inception and mid-term workshop reports were strong resources for learning and monitoring projects. A final report was developed capturing key lessons. Project reporting rated as *Satisfactory.*

40. Monitoring and reporting rated as *Highly Satisfactory*.

Sustainability

41. Socio-political sustainability of the project results varies from country to country. However, because of the success of the field trials, and the strength of the project partners, and the involvement of government stakeholders throughout the project, in most countries, results will be sustained (to a degree). Rated as *Likely*.

42. For financial sustainability, with the exception of China, financial sustainability is the biggest limiting factor for the project. Rated as *Moderately Likely*.

43. Institutional sustainability varies from country to country. At the international and regional levels, there are sufficient networks to further support general institutional strengthening and mutual support. Rated as *Likely*.

44. Sustainability is rated as *Moderately Likely.*

Factors affecting Project Performance

45. Preparation and readiness: Project relevant to country needs, strong baselines and readiness of countries for the project. Logical framework was sound. Governance and implementation structure was well laid out. Rated as *Satisfactory*.

46. Quality of project management and supervision: All project respondents highlighted the effectiveness, efficiency and support of the project management and supervision. Rated as *Highly Satisfactory*.

47. Stakeholder participation and cooperation: Partnerships and stakeholder participation were extremely important components of the project and in many ways, collaborations were strengthened through strengthened relationships between the project partners. Rated as *Highly Satisfactory*.

48. Responsiveness to human rights and gender equality: The project in its design was very responsive to human rights and gender equality. Project was self-aware of the gender-differentiated roles within the countries. Rated as *Satisfactory*.

49. Country ownership and drivenness: In all countries, championship was very strong in terms of project implementation and resultant sustaining of results. Rated as *Satisfactory*.

50. Communication and public awareness: Communication was a strong component and result of the project. Rated as *Highly Satisfactory*.

51. Rating for Factors affecting Performance is *Highly Satisfactory*.

Conclusions

52. The B4SS project has been used as a flagship in both UNEP and GEF platforms with regard to innovations in SLM and climate change mitigation. It was a great example of integration of scientific rigour and SLM innovation and social spread in agricultural communities in six countries around the world. The six countries were well-chosen and provided a diverse testing ground to biochar application in different contexts and allowed for a strong south-south learning approach throughout the project implementation.

53. The project was designed as research-action project. In all the countries, foundations for biochar had already been laid, and the key question is what would have happened if the project had not existed – would the same results have been achieved organically? The short answer is no. The project created a platform of sharing and connections between biochar actors around the world that would never have had the opportunity to share results and learn from each other. This not only provided an opportunity to learn and take up the learnings in their own country contexts, but also to strengthen professional bonds and catalyse change more rapidly within the SLM-biochar area. The key strength of the project is in the forging and strengthening of these relationships, and the level of commitment of the partners to attain and sustain project results.

54. The project overachieved on all its outputs, and in most outputs, delivered more than 10-fold what was envisaged at project design. This was, again, a testament to the project partners commitment to the project, displayed both in co-finance commitments, but also in ownership of project implementation, and championship. As highlighted by all project respondents, the project director at Starfish Initiatives should be commended for the coordination of this effort, and the overall success of the project.

55. The good practice guides, as well as other important informative materials and videos that were developed in the course of the project implement have been made easily available on the biochar website, and there has already been evidence of uptake and use of these. These are a valuable resource not only for the implementation countries, but also for other countries (e.g. the Spanish videos developed by Peru have been used as a resource in other South American countries). Capacity-development and training programmes were interwoven with the development of these materials and thus their use became very applicable.

56. The project design and TOC reflect well the overall aim and impact of the project, especially under the context of having to implement under a diverse set of circumstances (geographical variation, contextual variation, methodological variation, etc). The results and lessons from the project have been widely shared with key stakeholders, and especially government stakeholders, in most countries, were involved from the onset of project implementation.

57. Partnerships and collaborations with stakeholders were highly effective in this project, and in most countries, uptake by government extension services will take place (particularly, in e.g. Vietnam, Indonesia, China and Ethiopia). Farmers and local government were highly involved (and in many aspects took ownership of the project especially with regard to sustainability of results). The project also had a strong influence over students and increasing capacity of researchers and students, i.e. building a new generation of biochar experts locally, nationally, and globally.

58. The level of championship was a strong contributor to project success, and it must be highlighted that gender played an important component in some countries (e.g. women farmers in Vietnam).

The project was able to strengthen and empower women farmers and women scientists. In Vietnam, the strength of social organisation and structure (coordination, set-up of women's groups, regular meetings, etc) was a strong contributor to project results achievement and further sustainability.

59. Biochar should be placed within a bigger system of SLM and agriculture, which in turn is placed within a system that interacts with the social and economic dynamics. Unfortunately, these social and economic dynamics are moving towards unsustainable futures which need to be shifted using bigger leverage points not under the control of the project. However, the leverage points for biochar lie within four main areas, namely (a) the farming community, and their willingness to apply biochar, and this varies from country to country in terms of who farms, what farming practice takes place, and the social dynamics at play, and (b) the local government extension, (c) business and the value chain for biochar, and (d) scientists, and how they interface with the previous three.

60. As a result, achievement and move to impact will depend on external factors, but in the opinion of the evaluator, will come to fruition. In terms of sustainability, this move (if left to its own devices, i.e. no external intervention in countries) will be slower. Some interventions might be necessary to catalyse the move to impact. These are further discussed below.

61. Overall, the key achievements of the project include its results framework achievement, the strengthened professional relationships, the quality and quantity of information materials developed and disseminated, the visibility and platform for biochar as a result of the project, and the uptake and improvement of (many) farmers' lives as a result of being exposed to biochar.

62. The evaluation findings and ratings by evaluation criteria are discussed in Chapter V. Overall, the project demonstrates a rating of **Highly Satisfactory.**

Lessons Learned

63. The project, through its final reporting, and its final workshop report, has already drawn out very good lessons and recommendations for the project (including technical ones). This evaluation agrees with all of these and does not wish to duplicate them here. As a result, the lessons and recommendations should be read in conjunction with those coming out of those two reports. However, the evaluation threads out the key elements (a synthesis, so to speak), and makes a few additional recommendations.

64. The following lessons are a result of intensive discussions with project partners. They are meant to be useful for future project design and implementation (GEF/UN Environment, in the three main areas: LD, BD, CC), as well as useful for project partners in their continued work in biochar application. The lessons are discussed in more detail in the section Lessons learned.

Lesson 1: Championship is key to project results attainment and sustainability, catalytic role and replication

Lesson 2: Capacity development throughout project through exposure can create strengthened ownership and abilities to sustain results

Lesson 3: Being as participatory as possible and co-designing with farmers has the potential to improve design and increase uptake

Lesson 4: Diversity of countries in the context of this project was a powerful force for mutual learning and sharing

Lesson 5: Strong professional relationships lay a foundation for life-long commitments to achieving sustainability results

Recommendations

65. As mentioned above, the project already produced a strong list (in the form of a matrix) for B4SS – specifically aligned to each target group. These are technical and practical and will not be repeated here (see Annex 9 for easy access to these). The following recommendations are in addition to these and are intended to enhance sustainability for the spread of biochar and project continuity in general. The recommendations are discussed in more detail in the section Recommendations.

Recommendation 1: Integrate biochar as an SLM innovation into relevant GEF/UNEP projects.

Recommendation 2: Support value chain development in countries where biochar will not be produced at farmer level.

Recommendation 3: Continue scientific integrity and sustainability into biochar production technologies, through continued student support and collaborations, and networks.

Recommendation 4: Integrate TriPaDev methodology into relevant projects.

Recommendation 5: Integrate system dynamics modelling into future programmatic development for a greater understanding of sustainability leverage points in the system.

I. INTRODUCTION

66. Given the rates of land degradation globally and the interconnectedness between agricultural transformation and achieving the LD indicators for sustainable food security, it has become imperative to socially disperse SLM innovations as quickly as possible.

67. The "Biochar for Sustainable Soils" project, herein after referred to as the B4SS project, intended to build on the foundations laid by previous interventions and scientific field trials by evaluating the diverse formulations and application rates of biochar (as one type of SLM innovation) for different scenarios of soil types, climates and agricultural systems. It also intended to connect those who have strong scientific expertise with those who have strong capacities for rural extension.

68. The project focused on six countries: China, Ethiopia, Indonesia, Kenya, Peru and Vietnam. Each partner country identified that biochar may have a role to play in improving their management of agricultural land.

69. The learning from this project was intended to be utilized in GEF 6[1] to provide guidance in understanding the soil-based constraints to productivity, and a broader range of effective SLM interventions that support addressing food security issues. The knowledge generated was meant to support the GEF 6 integrated approach on "Sustainability and Resilience for Food Security in Sub-Saharan Africa". The project intended to link with relevant GEF projects in partner countries.

70. The B4SS project was developed in the context of UN Environment's Medium-Term Strategy for 2014-2017. It intended to contribute to UNEP's Subprogramme on Ecosystem Management and specifically, it contributed to the Programme of Work 2015-2016 Expected Accomplishment EA (a) "Use of the ecosystem approach in countries to maintain ecosystem services and sustainable productivity of terrestrial and aquatic systems is increased by (2) Tools, technical support and partnerships to improve food security and sustainable productivity of agricultural landscapes through the integration of the ecosystem approach."

71. As a GEF MSP, the project was developed in the context of the Land Degradation Focal Area, most notably: LD 1 Outcome 1.2: Improved agricultural management (Output 1.2. Types of innovative SL practices introduced at field level, and Output 1.5. Information on SLM technologies and good practice guidelines disseminated).

72. The project was implemented through the UNEP Ecosystems Division (formerly Division of Environmental Policy and Implementation, DEPI). Starfish Initiatives were the Executing Agency, and country level implementation was devolved to specific and appropriate institutions. The governance structure of the project is further discussed under Section III(d) below.

73. The intended duration of the B4SS project was (under) three years (July 2014 - April 2017). The actual project duration was 3 years and 8 months (April 2015 – December 2018). The project started almost 10 months later than anticipated. A project extension (Amendment to the PCA between UNEP and Starfish Initiatives) was signed in August 2018, to extend the project until December 2018.

74. The project cost was USD 3,084,282, of which USD 1,828,484 was GEF allocated, and USD 1,780,970 was co-financed.

75. In line with UNEP Evaluation Policy and the UNEP Programme Manual, as well as the updated guidance for evaluators (developed by the Evaluation Unit), the Terminal Evaluation of the B4SS

[1] The Global Environment Facility provides Programme Directions on a four-yearly basis, the 6th period refers funding agreements made between July 2014-June 2018.

Project (Sharing knowledge on the use of Biochar for SLM/Biochar for sustainable soils) was undertaken to assess performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability. As per the TOR, the evaluation has two primary purposes:

iii. To provide evidence of results to meet accountability requirements, and

iv. To promote operational improvement, learning and knowledge sharing through results and lessons learned among UNEP and its project partners (Starfish Initiatives, and country partners).

76. The evaluation, which is encompassed in this final report, identifies lessons of operational relevance for future project formulation and implementation, and also for the future planning of Biochar application in general.

77. The main Target audiences for the evaluation findings are:

- GEF, for future programming and synergy (as per Biochar application as a tool towards SLM)
- UNEP managers, including the Subprogramme Coordinator for Ecosystem Management concerned with alignment and contribution of the initiative to the approved UNEP Medium Term Strategy and Programme of Work, and ultimately with accountability to UNEP's governance bodies;
- The Project Technical Steering Committee;
- The Project Director, Project Country Coordinating Institutions, and Project Partners;
- Farmers, businesses and other stakeholders interested in biochar application;
- Future donors or investors interested in funding/financing biochar application.

II. EVALUATION METHODS

78. The evaluation was conducted by an independent consultant (herein after referred to as the 'evaluator'). The evaluation was carried out between June and November 2019 under the management of the Evaluation Office of UNEP, based in Nairobi. The evaluation employed a participatory approach with the UNEP Task Manager and (former) Project Director kept informed of progress throughout the evaluation and other project stakeholders provided with an opportunity to comment on the evaluation findings.

79. In line with UNEP Evaluation Guidelines, the project was assessed with respect to a minimum set of evaluation criteria grouped into the following 9 categories: Strategic Relevance, Quality of Project Design, Nature of External Context, Effectiveness (delivery of outputs, achievement of outcomes and likelihood of impact), Financial Management, Efficiency, Monitoring and Reporting, Sustainability and the Factors Affecting Performance.

80. The quality at project design was assessed during the Inception Phase and can be found in the Inception Report, available from UNEP Evaluation Office.

81. As per UNEP guidance, the evaluation ratings are on a six point scale.[2]

82. A Theory of Change was reconstructed during the Inception Phase (as there was none developed during project design) based on an extensive desktop review of all project documentation, and initial interviews with key project partners. This Theory of Change was then presented and discussed with all project partners involved in the evaluation, inputs and suggestions for improvement were sought, and the revised version can be found here in section IV of this report.

83. The strategic questions for the evaluation, as set out in the evaluation Terms of Reference (TOR) were:

    a. To what extent have the good practice guides on SLM technologies been disseminated in each participating country (linked to Outcome 2)?

    b. To what extent are the project design, (reconstructed) Theory of Change, and results framework suited to a project that encompasses six pilot interventions? Specifically, what evidence exists to suggest that the results, lessons and experiences generated by the pilot projects are ready to be scaled up or replicated either within the implementation countries, or in new target areas?

    c. What has been the degree and effectiveness of partnership collaboration with stakeholders? Are partner countries' government officials aware of the project outcomes? What are the opportunities to engage with more stakeholders? (related to Stakeholder Participation and Country Ownership – Factors affecting performance)

    d. To what extent was a customized gender sensitive approach adopted for selecting and/or involving fe/male farmers and researchers? What effect did this have on the project outcomes, if at all?

[22] Most criteria are rated against the following points on the scale: Highly Satisfactory (HS); Satisfactory (S); Moderately Satisfactory (MS); Moderately Unsatisfactory (MU); Unsatisfactory (U); Highly Unsatisfactory (HU); Nature of External Contex is rated from Highly Favourable (HF) down to Highly Unfavourable (HU); Sustainability and Likelihood of Impact are rated from Highly Likely (HL) down to Highly Unlikely (HU).

84. The evaluator developed an evaluation matrix (found in Annex B of the Inception Report) which consisted of an extended set of questions based on the above strategic considerations as well as the evaluation criteria set out in the TOR.

85. The findings of the Evaluation are based on the following:

    a. A desktop review of project documents including deliverables, reports of consultative meetings, financial reporting, and project reporting, as well as other related reports. (See provisional list of documentation in Annex 2),

    b. Visits to three countries: China, Ethiopia and Vietnam (field visits, and interviews with project coordinators, stakeholders and farmers, Annex 2),

    c. Telephone (skype) interviews with country coordinators: Indonesia,[3] Kenya, Peru, as well as members of the Technical Steering Committee (see Annex 2),

86. Evaluation interviews followed a semi-structured format, with questions tailored to the role or interest of individual stakeholders in the project.

87. The evaluation TOR anticipated visits to three of the six countries. Countries were selected with a view to including a cross section of issues being addressed in the country projects. During the inception meeting, country selection was discussed in detail, and the following criteria were used to select the three countries:

    i. Diversity and extent of implementation (i.e. different implementation techniques);

    ii. Project process highlighting important lessons learned for future country engagement, particularly in terms of unique country contexts;

    iii. Level of stakeholder engagement and availability within the timeframe;

    iv. Difficulty in gaining information and engaging stakeholders in the evaluation visits remotely (i.e. via email/phone).

88. The countries chosen to visit for the evaluation, according to the above criteria, were thus China, Ethiopia and Vietnam.

89. Evaluation findings and judgments are based on sound evidence and analysis, clearly documented in the evaluation report. Information has been triangulated (i.e. verified from different sources) to the greatest extent possible. Analysis leading to evaluative judgments is clearly spelled out.

90. There were no limitations or challenges faced during the evaluation that would have affected evaluation results. Of course, in-country visits vastly enrich any evaluation, and like any evaluation, this one is limited by the fact that only three of the six countries were visited. However, evaluations, and in particular, country visits, are bound by time and financial constraints and as such, are a compromise.

91. This evaluation was bound to the Ethical Code of Conduct as per the UNEP Evaluation policy, which includes the following key factors: (a) all interviews and information were provided in confidence and anonymously and no information can be traced back to a direct source/individual, (b) those involved in the evaluation have had the opportunity to review the evaluation findings as well as the main evaluation report, (c) the evaluator was sure to have empathy and sensitivity to different contexts and cultures in which stakeholders work.

[3] For Indonesia, there were technical problems with the call, and thus the call was ended and the interview was conducted via email instead.

III. THE PROJECT

A. Context

92. The intentional production of biochar for use as a soil amendment is a relatively novel concept that has come up in (more public, mainstream) research and investigation in the past decade and a half. Prior to the project being implemented, (mostly) lab and pot-trial research had produced evidence that biochar is effective in enhancing soil health. The assumption from this point of departure was that the use of biochar as an innovative organic-based soil amendment enhances the fertility and water-holding capacity of soils (and in particular, in the drylands), thus enhancing productivity and assisting to address food security issues, while at the same time ensuring the regenerative abilities of soil.

93. In addition to enhanced crop production, the application of biochar could also result in watershed protection, carbon sequestration and GHG mitigation; and thus, generally, sustainable land management.

94. As a result, there has been growing interest from various and diverse groups of stakeholders in its application, including farmers, universities, public institutions, private companies, and civil society groups. This not only for soil regeneration and crop production, but also related to the diffusion and adoption of biochar-making cook stoves (thereby reducing respiratory and eye diseases associated with indoor air pollution).

95. So far, as mentioned above, prior to project implementation, scientific research (although comprehensive in terms of understanding the chemical, physical and biological processes involved in biochar amendments to soil) was limited to laboratories and pot trials, although some foundations for field-testing with farmers had already been laid. The results of these foundations and demonstrations had also not been fully assessed and disseminated. As a result, limited awareness ensured that the use of biochar had not been widely adopted.

96. The project aimed to build on these foundations by testing various applications in different country contexts and in different farming situations (different soil types, crop types, social dimensions). The project focused on six countries: China, Ethiopia, Indonesia, Kenya, Peru and Vietnam. These countries are facing various challenges (and to differing extents): declining productivity of land due to unsustainable land management, heavy metal contamination of some soils, and pollution caused by improper disposal of organic “waste”. Each partner country identified that biochar may have a role to play in improving their management of agricultural land.

B. Objectives and components

97. The Project Objective was to ”*demonstrate and promote the adoption of SLM practices involving the use of innovative organic amendments, based on biochar, that improve the capture and efficient use of nutrients, and enhance productivity, improve climate resilience, support rural livelihoods, and contribute to watershed management*”.

98. The project was organized under two components, each of which was associated with an outcome. These are stated below in Table 2.

Table 2. B4SS Outcomes and Outputs as per approved Project Document

Component	Stated Project Outcomes	Outputs
Evaluation of the role of biochar in sustainable land management.	Increased understanding of the potential of biochar in improving productivity and addressing issues of declining soil fertility and	1.a) Collation of demonstration results comparing biochar with alternative management practices;

Component	Stated Project Outcomes	Outputs
	mismanagement of nutrient resources.	1.b) Evaluation of a range of formulations and application rates of nutrient-enhanced biochar; and 1.c) Collation of recommended practices for the use of biochar in SLM.
Knowledge management, dissemination and capacity building.	Knowledge generated and disseminated on the appropriate use of biochar to improve the capture and efficient use of nutrients, while reducing air and water pollution; Increased awareness and improved understanding amongst smallholders, including women's farming groups, and resource managers of the use of biochar to address soil constraints, and most effective application rates and formulations (e.g. mix with other organic and mineral amendments) to achieve agronomic benefits.	2.a) Guidelines for the use of biochar in SLM; 2.b) Networks of demonstration sites and farming groups; and 2.c) At least 36 smallholders and resource managers trained in the use of biochar as soil amendment.

C. Stakeholders

99. The main stakeholder groups of the project were:

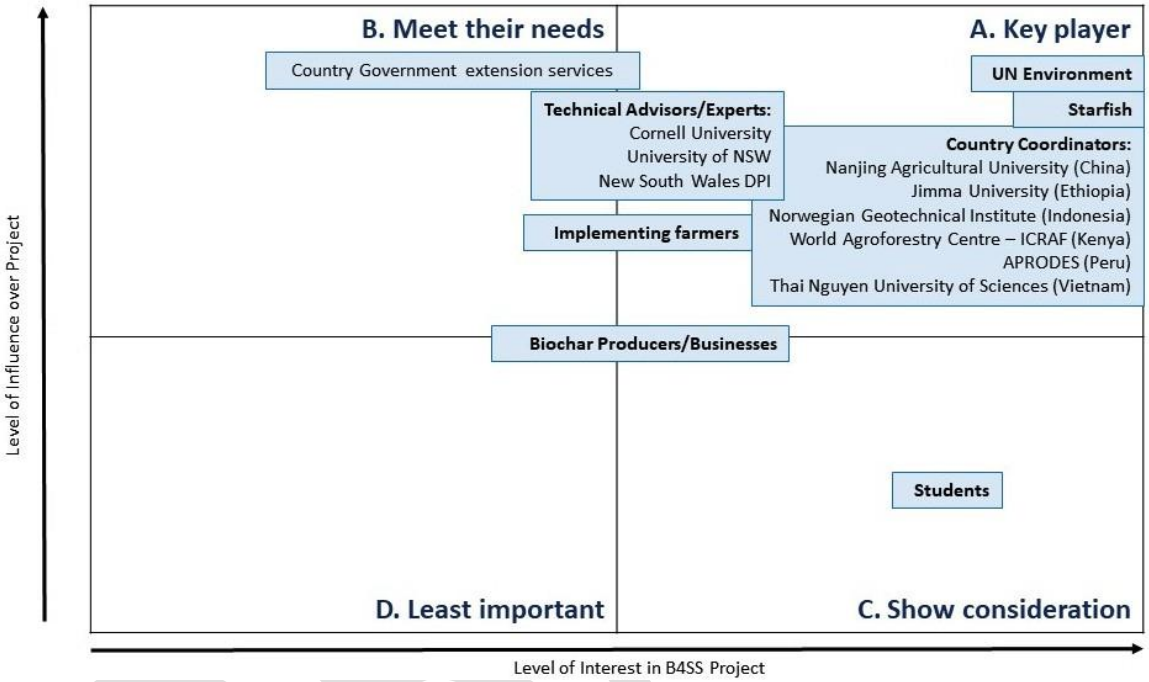
i. Farmers and users of biochar, as the primary users and beneficiaries of the biochar application methods.
ii. National experts, scientists and researchers, which formed part of the project implementation at country-level.
iii. International experts and scientists formed part of the Technical Steering Committee and provided scientific rigour to the project and themselves benefited from the field research contributing to the base of knowledge in their areas of expertise.
iv. Government extension and relevant government partners, whose role it is in many countries for leading and/or supporting the spread of new SLM innovations.
v. Business entities involved in biochar production value chains, in some countries (e.g. China).
vi. Students and upcoming researcher/scientists who were involved in various phases of the project and gained capacity and growth in their respective fields (through understudies, Masters, Honours, etc).

100. Stakeholder involvement and communication channels were further analysed during the evaluation, particularly in terms of sustaining of the network connecting scientists and practitioners/users/producers. These are further discussed in the evaluation findings.

101. The project document takes into account some gender considerations (as discussed in the Project Design above), implementation activities in some countries in particular, had strong women-representation and leadership in projects (e.g. Vietnam). Gender considerations in general were taken up throughout project implementation; these are also further discussed in the evaluation findings.

102. Figure 1 provides a mapping of the main stakeholder groups associated with planned project deliverables and extension, using a power/ interest grid leading to a classification of stakeholders by the following types: *Type A:* High power/high interest (Key Player), *Type B:* High Power/Low Interest over the project (Meet their needs), *Type C:* Low power/high interest over the project (Show consideration), *Type D:* Low power/low interest over the project (Least important). The focus in this matrix is on delivery of the project outputs rather than achievement of higher level outcomes and impact. The relative 'power' of stakeholders shifts at higher levels in the results chain (see Theory of Change Section 4), and the evaluation report will provide inputs in this regard.

Figure 1. Overview of Project Stakeholders of the B4SS project using power interest grid



D. Project implementation structure and partners

103. The governance structure of the project was as follows (and can be found illustrated in Figure 3):

v. UNEP Ecosystems Division (formerly Division of Environmental Policy Implementation, DEPI) was the **Implementing Agency** for the project. Thus, it was responsible for coordinating activities, monitoring the implementation of UNEP's standard monitoring and reporting procedures, and transmitting financial and progress reports to the GEF.

vi. Starfish Initiatives was the **Executing Agency**, who would execute the project through a project director. The Project Director was accountable to the Starfish Board of Directors. The Project Director was responsible for leading, coordinating, and successfully delivering the Project's purpose as defined in the project plan and UNEP Project Cooperation Agreement. The Director was also responsible for reporting to the Technical Steering Committee, preparing Agendas and providing Progress and Performance Reports, and other publications as required. The Director was also responsible for overseeing the six country coordinators.

vii. The project had a **Technical Steering Committee (Scientific Advisory Panel)**, which was responsible for overseeing and contributing to the successful delivery of the Project and comprised of individuals with expertise in biochar production and application, sustainable development, land degradation and SLM and project management. The main purpose of the committee was to ensure the scientific integrity of the project.

viii. Country coordinators, project partners, and in-field personnel reported to the Committee, through the Project Director, and participated in various meetings as appropriate. Each country coordinator was responsible for the implementation of baseline activities and **day-to-day management** of the project in each country's biochar initiative. Country coordinators were as follows: Nanjing Agricultural University (China), Thai Nguyen University of Sciences (Vietnam), APRODES (Peru), Jimma University (Ethiopia), World Agroforestry Centre – ICRAF (Kenya), Norwegian Geotechnical Institute (Indonesia).

ix. Project partners included **expert advisory support** from Cornell University and NSW DPI (part of the Scientific Advisory Panel). The University of Udine contributed to the launch of the Africa Biochar Partnership held at ICRAF on 1 March 2016.

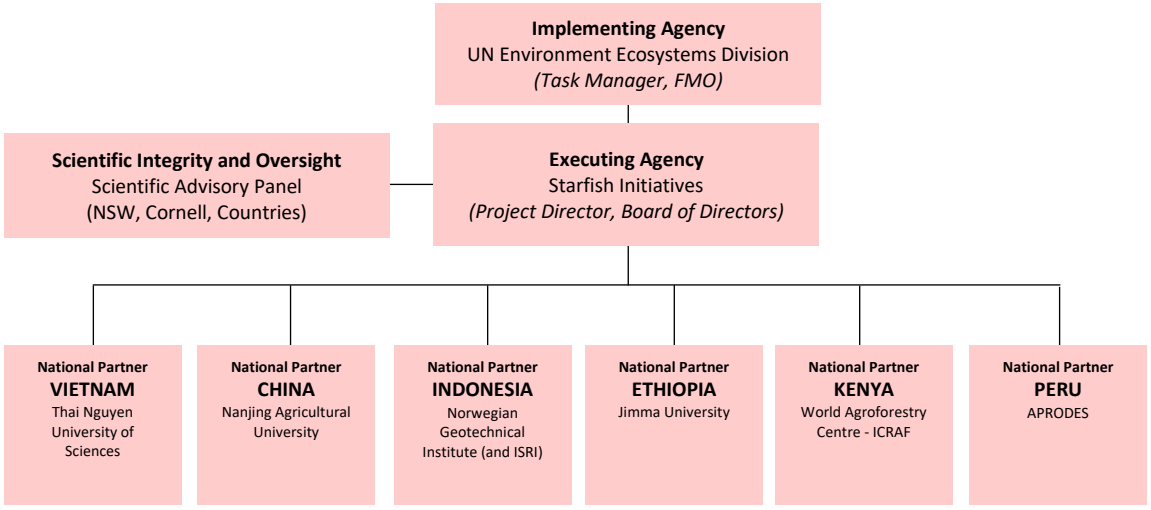


Figure 2. Simple Organigram illustrating Implementation and Governance Structure of the B4SS Project

E. Changes in design during implementation

104. A few changes took place at the onset and during implementation of the project that warrant elaboration, these are broken up below into *implementation activities*, *partners*, *co-financing,* and *extensions*.

105. *Activities:* At Inception workshop, the implementation structure and results framework were discussed in much detail – as well as their appropriateness on the ground now that the project had been started. A few refinements to the activities for some of the countries were sought and agreed to by the project team. These included:

i. In China, it was agreed to modify some of the demonstration sites, as well as refining the comparison of production technologies to include cost and properties of the biochar in the comparison.

ii. For Indonesia, there was also a change of demonstration sites (this though took place slightly later on in the project, in addition to change in partners, which is further discussed below).

iii. In Ethiopia, the project partners wanted to add a high value vegetable crop into the field trials, as well as include translations of materials into vernacular languages. Kenya partners also wanted to work on translating the materials into vernacular.

iv. In Peru, it was decided to purchase a medium-scale biochar reactor in Peru instead of biochar-making stoves mentioned in the project document.

106. *Partners:* Prior to project implementation the Peruvian partners changed from the Universidad Cientifica del Sur to the Peruvian Association to Promote Sustainable Development (APRODES).[4] In Indonesia, the national project partners were changed (due mostly to lack of correspondence and non-implementation) to the Norwegian Geotechnical Institute.

[4] This was formally acknowledged in August 2015. Inception Workshop Report.

107. In part as a result of partners changing (i.e. in the case of Indonesia), as much as USD 523,170 additional co-financing was secured during project implementation (see below in Table).

108. A no-cost project extension was approved for the project and an amendment was signed in August 2018, to extend the project beyond intended closure April 2017 until December 2018 (Amendment to the PCA between UN Environment and Starfish Initiatives).

Table 3. Additional co-financing secured during implementation for the B4SS project[5]

Co-financing committed at approval	**Additional Co-financing secured during implementation**
Total: USD 1,257,800	***Total: USD 522,884***
Starfish Initiatives: USD 430,786	Starfish Initiatives: USD 56,352 (in-kind)
UNEP: USD 350,000	UNEP: USD 50,000 (in kind)
Cornell University: USD 150,000	World Agroforestry Centre – ICRAF: USD 195,701 (in-kind)
Thai Nguyen University of Sciences: USD 98,000	Norwegian Geotechnical Institute: USD 20,000 (cash) USD 80,000 (in-kind), i.e. USD 100,000
APRODES: USD 80,000	University of Udine: USD 19,331 (cash)
NSW DPI: USD 64,000	NSW DPI: USD 5,500 (in-kind)
Nanjing Agricultural University: USD 60,000	Nanjing Agricultural University: USD 81,000 (in-kind)
Jimma University: USD 25,000	Jimma University: USD 15,000 (in-kind)

F. Project financing

109. The total project budget at approval was USD 3,607,454, of which the GEF allocation was USD 1,826,484, and co-financing was USD 1,257,800. Additional co-financing (as per Table 3 above) of USD 522,884 was secured during implementation (more information is shared in Annex 3 of this report), and so, by the end of the project, a total of USD 1,780,960 was secured (versus the anticipated USD 1,257,800 at project design).

110. The budget at design compared with expenditure is shared in Annex 3.

[5] Final Co-finance Report (5824 Biochar Final Co-finance Report FY18.5)

IV. THEORY OF CHANGE AT EVALUATION

111. The B4SS did not have a Theory of Change developed during its design phase (this was not a prerequisite during the development of the project). For the purpose of informing the evaluation, and particularly for deepening the understanding of the project in a larger context of improved SLM, the evaluator has developed a reconstructed Theory of Change (the TOC diagram can be found on the next page, Figure 3). The below narrative and Theory of Change was tested through consultations with key stakeholders and what is presented below is a refinement of what was presented in the initial Inception Report TOC.

112. The project aimed to contribute, more broadly, to the Expected Accomplishment "Use of the ecosystem approach in countries to maintain ecosystem services and sustainable productivity of terrestrial and aquatic systems is increased by (2) Tools, technical support and partnerships to improve food security and sustainable productivity of agricultural landscapes through the integration of the ecosystem approach."

113. The project objective was to "*demonstrate and promote the adoption of SLM practices involving the use of innovative organic amendments, based on biochar, that improve the capture and efficient use of nutrients, and enhance productivity, improve climate resilience, support rural livelihoods, and contribute to watershed management*". The evaluator has, in drafting the reconstructed Theory of Change, defined ***a longer-term***, achievable impact that fits within the broader SLM and LD neutral agenda (vis. The SDGs), if results of the project are sustained and further catalysed in the long-term.

114. The final impact(s) of the TOC is thus: the eventual and long-term hope for the project is that it supports movement towards the mainstreaming of biochar application in relevant areas and as appropriate, to further improve SLM and soil productivity. This will further improve the health and resilience of the soil, watersheds, and, ultimately, the rural livelihoods (based on sustained food security, and improved air quality connected to cookstoves). Figure 3 describes the process and flow for the impact to be attained.

115. Analysis of the impact pathways was conducted in terms of the assumptions and drivers that underpin the processes involved in the transformation of outputs and outcomes to intermediate states to impact. The intermediate states are the transitional conditions between the project's direct outcomes and the intended longer-term impact. The drivers are the significant external factors that are expected to contribute to the realization of the intended impact and which can be influenced by the project. The assumptions are the external factors that are expected to contribute to the realization of the intended impact and which are beyond the influence of the project.

116. Generally, the intermediate states are a result of the increasing base of knowledge through field testing, as well as an increased general understanding of the role of biochar in enhancing soil productivity (among other positive contributions), particularly among farmers, as well as its use and application in many farm-related settings. This should lead to greater uptake and use of biochar in the six countries, and also in other countries.

117. The drivers that the project has had influence over to enhance understanding and thus informed application is the coordination and connection through an enhanced network of scientists, an enhanced network and improved relationship between farmers, national scientists and other relevant stakeholders (e.g. local government) that are more equipped to share and learn from each other. Another key driver, related to this, is particularly the connection between the scientific communities and the practitioners/users of biochar. This network should catalyse the intermediate state (i.e. access and support structures toward increased use).

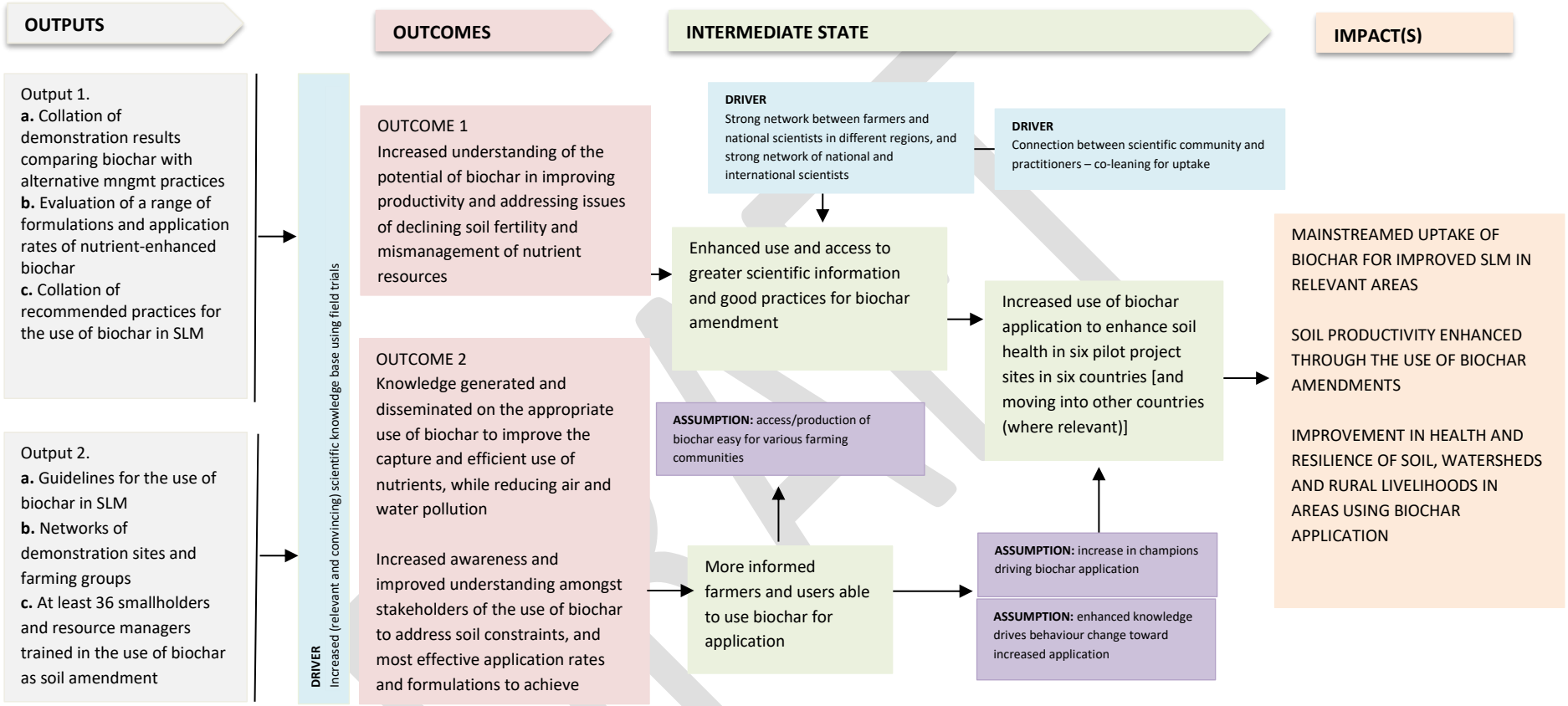
118. Three key assumptions were tested during the evaluation, these include:

i. *Enhanced knowledge/experience drives behaviour change toward increased application*. The assumption that enhanced knowledge drives a change in behaviour, usually common in many projects, is not always realized (climate change is a key example). In fact, in some countries enhanced knowledge of the usefulness of biochar did not necessarily lead to enhanced uptake (e.g. Vietnam is a key example here). This will be further elaborated on in the Evaluation Findings.

ii. *Production/access of biochar easy for various farming groups*. Increased use will depend on improved knowledge and ability to produce, biochar. The project did a lot of testing on this, and while the focus was on biochar production, the assumption held that the easier it is to make/access it, the more it will be applied. However, in some countries (e.g. Vietnam) farmers preferred to buy than make (this will be further elaborated on in the Evaluation Findings).

iii. *Increase in champions driving biochar application*. This assumption is related to assumption (i). However, it could also be argued that it could be a driver. The evaluator has defined it as an assumption because this was not a direct intention of the project, merely that increased knowledge and field testing with farmers may result in an increase in champions, and thus more sharing of knowledge and further uptake. But creation of champions is often not directly under the control of the project, it is a behaviour change mechanism that might be catalysed by enhanced knowledge and understanding. Championship was an integral part of the project (particularly at farmer-level), and this will also be further elaborated on in the Evaluation Findings.

Figure 3. Reconstructed Theory of Change diagram for the B4SS Project



V. EVALUATION FINDINGS

A. Strategic Relevance

119. The B4SS was highly relevant in the context of UNEP's Medium Term Strategy for 2014-2017, and was consistent with the POW 2014-2015 and clearly outlined the Expected Accomplishment relevant to the project (EA (a) Use of the ecosystem approach in countries to maintain ecosystem services and sustainable productivity of terrestrial and aquatic systems is increased by (2) tools, technical support and partnerships to improve food security and sustainable productivity in agricultural landscapes through the integration of the ecosystem approach).

120. The project contributed specifically to the LD targets of GEF-5, namely LD-1 and LD-4.[6] Most specifically, it addressed LD Outcome 1.2 (Output 1.2, Output 1.5).[7] The learning from this project was intended to also be utilized in GEF-6 to provide guidance in understanding the soil-based constraints to productivity, and a broader range of effective SLM interventions that support addressing food security issues. The knowledge generated was meant to support the GEF-6 integrated approach on "sustainability and resilience in food security in sub-saharan Africa". Given the use of the project as a 'case study' on the GEF platform, as well as the review of the GEF-6 direction and planning documentation, there has certainly been some integration of the lessons from this project.[8]

121. In addition, in terms of its relevance to global environmental priorities, the project was also consistent with the Rio+20 Outcome Document (The Future We Want), most notably Paragraph 93 (raising wider awareness of the economic benefits of sustainable land management policies), as well as the SDGs (Goal 2 and 15).

122. In terms of the project's relevance to the six countries implementing the project, it was clear at project design that there was a keen interest and demand by each of the six countries. In, China, various government-mandated planning processes have supported the integration and use of biochar (including, e.g. directives to stop open burning of agri-waste and remains, reducing 10% use of fertilizer, etc).[9] Building on its foundations (through the 11th Five Year Plan 09-10 and the New Countryside Program 06-10), the project was welcomed and incentivised nationally in China. In Vietnam, recognition and focus has been given in the past to prevent soil erosion, land rehabilitation and other LDN areas (e.g. through its National Barren Land Programme 92-98). Indonesia, through its NAP, has in the past focused its SLM through the National Agriculture Strategy (10-14). Ethiopia and Kenya align through their NAPAs and NBSAPs. In Peru, particularly given the recent cocoa restrictions by the EU, they have been looking at SLM investment and interventions, with a particular focus on leeching out heavy metals in the soil.

123. The project had strong baselines in all six countries, these were outlined in detail in the project document.[10] In addition, the evaluator observed that, during implementation, efforts were made to synergise with ongoing interventions (including, e.g. Biochar+ and the launching of the Africa Biochar Partnership).[11]

Rating for Strategic Relevance: Highly Satisfactory

[6] LD-1: Outcome 1.2. Improved agricultural management, Output 1.2: types of innovative SL/WM practices introduced at field level, and Output 1.5: information on SLM technologies and good practice guidelines disseminated. LD-4: Improved GEF portfolio monitoring using new and adapted tools and methodologies and GEF-financed projects contribute to SLM/SFM/INRM knowledge base.
[7] Ibid.
[8] Interviews with relevant proponents (July 2019), review of GEF-6 documentation, use of UN Environment B4SS story on GEF platforms.
[9] Interviews with country partners (July 2019).
[10] Project Document. 19052014. UNEP GEF Biochar MSP.
[11] Interviews with project proponents, and review of project implementation documentation.

B. Quality of Project Design

124. Generally, the project was well-designed, especially with regard to country-level implementation. Baselines were detailed, and points of departure were clearly laid out.

125. *Project Preparation and Readiness:* The project was generally well prepared, with a clearly laid-out problem analysis. The evaluator believes that the stakeholder analysis could have been more relevant and contextualized at project design, especially given the detail provided for the baselines in each country. Effort was made during the project to include gender considerations during implementation, as well as when drawing lessons for sustaining project results.[12]

126. *Intended Results and Causality at Project Design*: No Theory of Change was developed at project design (this was not a prerequisite at the time of project development). However, the project logical framework did make a sufficient link regarding the causal pathways between outputs and outcomes.

127. *Governance and Supervision Arrangements*: Given the complexity of the project (six countries in diverse geographical positions and contexts), the project governance was well-laid out at design – one of the contributing factors to success of project implementation.

128. *Partnerships*: At design, the project implied that international biochar experts would be involved in project advisory support and implementation. Implementation roles were clearly defined, but no detailed capacity assessments were outlined (given the partner changes during implementation, especially vis. Indonesia, this may have been an important step missed out on during project design).[13]

129. *Learning, Communication and Outreach:* The project, already at design, had a strong component for learning, communication and outreach of knowledge generated through the project. Outcome 2, in particular, focused on knowledge management and sharing. This outcome is a key contributor to the Theory of Change causal pathways to impact.

130. *Financial Planning/Budgeting:* The project budget was well-laid out and achievable. Despite the small project budget, project activities were laid out efficiently to reduce costs. Co-financing was secured at project design.

131. *Efficiency:* As already mentioned above, the project was realistic in its costing and duration (at design). It has a strong baseline and made a deliberate effort to align and support ongoing initiatives in the six countries, as well as form part of a larger network of GEF SLM projects in the regions. The project document had a detailed section on cost-efficiencies and effectiveness.[14]

132. *Sustainability/Replication and Catalytic Effects:* The project document had a section on sustainability and potential for scaling results. In this section, the project highlighted that it was merely designed to test the *potential* for further uptake of biochar application, and use its knowledge sharing and capacity development approaches to support sustaining of results and potential future uptake.

133. *Identified Project Design Weaknesses/Gaps:* There was no Project Review Committee for this project, but there was a GEF review. All issues for the GEF review were effectively addressed in the response. The largest gap in project design (and not picked up in the GEF review) was that the stakeholder analysis could have been more effectively developed at the onset (including basic capacity assessments).

[12] Interviews with various project respondents (July 2019).
[13] Interviews and project document review (July 2019).
[14] See footnote 9.

Rating for Project Design: Satisfactory

C. Nature of the External Context

134. Generally, risks, in terms of the nature of external context, were low for the six countries. At project design phase, there was no likelihood of conflict in any of the countries. One risk that needed mitigation (and was covered project design) was the demonstration sites being affected by environmental disasters. In some cases (e.g. Kenya) flooding and pests did hamper demonstration site results – but this did not significantly affect the project results overall.

Rating for Nature of the external context: Favourable

D. Effectiveness

Delivery of Outputs

Outcome 1: Increased understanding of the potential of biochar in improving productivity and addressing issues of declining soil fertility and mismanagement of nutrient resources

Output 1.a. Collation of demonstration results in comparing biochar with alternative mismanagement practices

Figure 4. Site visits to farmer demonstration plots in (a) China, (b) Ethiopia, and (c) Vietnam during the B4SS Terminal Evaluation, July 2019

135. Overall, biochar was compared with alternative management practices in 13 demonstration sites across the six countries.[15] The end-project target for this output was six or more sites, which means that the project overachieved in this output.

136. In China, the field experiment was conducted over three years (2015-2017) in Laiyuan country, Hebei province, with maize crops (and in some sites, vegetables), comparing biochar amendments with control sites (fertilizer only). Generally, the field experiments were successful in illustrating positive results for using biochar, and farmers saw positive results (in yield and crop health). However, farmers maintained that biochar was difficult (and labour-intensive) to handle and apply to the fields, and thus preferred to buy biochar-supplemented fertilizer (versus making it and applying it themselves).[16]

137. In Vietnam, the effects of biochar on rice paddies and maize crops (as well as small-scale home vegetable gardens) were tested. In the first season, there were design weaknesses which affected the results. This was picked up by one of the scientific advisory panellists and subsequently the field design was improved.[17] Despite successful results, uptake was limited, mainly because of cost and labour requirements (this will be further discussed under the sustainability section).

[15] Final B4SS Project Report.
[16] Final B4SS Workshop Report, 9-12 July 2018 & Interviews with project proponents (July 2019).
[17] Ibid.

138. In Indonesia, field demonstration sites were tested using cacao shells to maize plots. High application of biochar significantly increased maize yield (as did the addition of lime and ash). In farmer trials (these were conducted in Lampung and Lamongan) biochar was tested for crops including maize, cassava and upland rice, and had significant positive results (more so in the acidic soils). The late entry of NGI and ISRI (due to the partner change in the first year of implementation) delayed project activities in Indonesia. Despite this, the project partners were able to achieve the necessary project results by end of project.[18]

139. In Ethiopia, biochar formulations evaluated in the farmers- and researcher-managed fields (to grow maize and soy beans) illustrated both increase in yield, and savings on fertilizer use.[19]

140. In Kenya, the effects of biochar application was evaluated on maize crops (and high value crops). There were some external challenges in the first season, which included hail, maize lethal necrosis, livestock invasions, crop theft and seed germination failures. However, the second season showed increases in yield compared to the control. Generally, what was most notable in Kenya, was the co-design of experiments with farmers (a participatory approach), which will be discussed in more detail in subsequent sections of this report.[20]

141. In Peru, project areas included Lurin and San Ramon. In Lurin, green municipal waste was used to produce biochar. In San Ramon, biochar formulations were compared with controls on maize crop. Biochar had significant results here too, but this depended on the formulation and application rates.[21]

Output 1.b. Evaluation of a range of formulations and application rates of nutrient-enhanced biochar

Figure 5. Different methods of making biochar in (a) China, (b) Ethiopia, and (c) Vietnam, B4SS Terminal Evaluation mission, July 2019

142. The target for this output in the logical framework, was that at least 24 biochar formulations and application rates were to be tested during the life of the project. In fact, by the end of the project, 34 different combinations were tested.[22]

143. In China, different tonnages and rates of application were tested on maize and potatoes in one field trial. In another, NAU compared the effects of different straw management practices on crop yield (including control – chemical fertilizer, direct crop straw return, biochar every season low application, biochar applied once at a high application, and biochar compound fertilizer). The results showed the highest yield increase with biochar-compound fertilizer – which was also seemingly the most popular choice for farmers (if it is comparable in price to chemical fertilizer).[23]

[18] Ibid.
[19] Ibid.
[20] Ibid.
[21] Ibid.
[22] Project Document Logical Framework, Project Final Report.
[23] B4SS Final Workshop Report, interviews with project respondents (July 2019).

144. In Vietnam, various formulations were tested on both maize and rice plots (farmer and demo). As mentioned above, weaknesses in the initial project design caused incorrect results in the first season for the maize plots, which were rectified – but this had implications on the final design of the trial – which were then designed around the effect of biochar application on nitrogen use efficiency.[24]

145. In Indonesia, variations included chemical fertilizer (control), biochar and chemical fertilizer, lime and chemical fertilizer, washed biochar and chemical fertilizer, and ash and chemical fertilizer. Application amounts of biochar also varied. On average, here (particularly in Lampung) showed that ash from feedstock produced the highest crop results. They also conducted a Life Cycle Assessment study of various biochar-making technologies and found that Kon Tiki kilns are the most sustainable (if heat energy released is used in the process).[25]

146. In Ethiopia, biomass residues included, mostly, coffee husks, and cattle bones. Co-composting the biochar with manure was done and evaluated different formulations within the researcher- and farm-based plots. Initially they started producing biochar in an expensive biochar oven (that had been financed, prior to the project, by Cornell University). They engaged engineering students to simplify and design various biochar-making stoves; these were further improved after the Ethiopian project partners were exposed to the Kon Tiki kiln during the final workshop visit to Indonesia.[26]

147. In Kenya, a highly participatory approach was taken in the field trial design process (ParTriDes), which included focus on farmer needs and soil challenges as per the perceptions of the farmers. Participatory trials and demo sites tested various combinations and application rates of biochar, but also allowed farmers to innovate and test their own variations.[27]

148. In Peru, the Roo batch pyrolyser and the Kon Tiki kilns were evaluated at the B4SS research station in Lurin. The Kon Tiki kiln proved to be the most promising technology for small-scale biochar production, while the pyrolyser was most appropriate for demonstration purposes. Five different formulations were tested in field designs in Peru (and most notably in San Ramon).[28]

Output 1.c. Collation of recommended practices for the use of biochar in SLM

149. The learnings of the previous two outputs were well documented, both in terms of country-level flyers and pamphlets, as well as videos, and reports.[29] A report of B4SS recommendations was developed (uploaded on the website[30]). This was also displayed and presented at the UNFCCC COP-24 (December 2018).[31]

Outcome 2: Knowledge generated and disseminated on the appropriate use of biochar to improve the capture and efficient use of nutrients, while reducing air and water pollution; and increased awareness and improved understanding amongst smallholders, including women's farming groups, and resource managers of the use of biochar to address soil constraints, and most effective application rates and formulations (e.g. mix with other organic and mineral amendments) to achieve agronomic benefits

Output 2.a. Guidelines for the use of biochar in SLM

[24] Ibid.
[25] Ibid.

[26] B4SS Final Workshop Report as well as interviews with project respondents.
[27] Ibid.
[28] See footnote 15.
[29] Well documented here https://biochar.international/.
[30] Ibid.
[31] See footnote 14.

150. B4SS good practice guides were developed and disseminated at global level and country-level.[32] A video was developed of the project in general (animation), and then at country level (particularly for Indonesia and Peru) context-specific videos were developed. Different pamphlets and guides were developed at country level, and where appropriate, these were translated into vernacular languages (as in the case of Ethiopia and Kenya, in Ethiopia radio and television shows were also broadcasted a few times).[33]

151. The ParTriDes methodology was also put together as a guide and is available on the website.[34] B4SS recommendations, as well as guides on which reactor to use for what context, the basic principles of biochar production, a biochar cartoon and several posters, as well as IBI white papers on the potential of biochar to improve coffee and maize production were developed.[35]

152. Twelve scientific articles were published in peer-reviewed journals, with several more in the pipeline (both at global, and at national level).

153. In general this output was also delivered beyond project expectations.

Output 2.b. Networks of demonstration sites and farming groups

Figure 6. Meetings with country stakeholders in (a) China, (b) Ethiopia, and (c) Vietnam during the B4SS Terminal Evaluation mission, July 2019

154. According to the project final report, seven biochar networks were created as part of the implementation of the project. The evaluator did not find evidence of all of these networks and their activity. However, it is evident that networks and professional relationships were one of the most productive and successful results of this project, and especially in terms of sustaining project results.

155. At international level, the project supported and possibly strengthened some elements of the International Biochar Initiative and supported the launch of the Africa Biochar Partnership.

156. The project connected and further strengthened relationships between country-level scientists, and international scientists (as well as between international scientists). In addition, networks were strengthened between farmers and country-level scientists (in all countries). Relationships strengthened or developed through the project will be a testament to the project eventually attaining impact (this will be further discussed under sustainability).

157. Another (very loose) network developed was upcoming (Masters-/PhD-level) biochar scientists and their link to more senior, international biochar experts. This provided an opportunity for exposure and capacity development (including opportunities for PhD and Post-Docs in other countries), and a rise of young next-gen biochar scientists.[36]

[32] Most of the guides are available on the website: https://biochar.international/.
[33] Interviews and review of guides.
[34] See here https://biochar.international/guides/participatory-trials-design-partrides-methodology/ and here http://old.worldagroforestry.org/downloads/Publications/PDFS/B17459.pdf.
[35] See footnote 32.
[36] Particularly, as an example, in Ethiopia, this was evident, but also in Indonesia, China, Vietnam, Peru. (Interviews with project respondents, July 2019).

Output 2.c. Smallholders, farmers, resource managers, development agents, agricultural extension staff, researchers, B4SS project members, producers of biochar-making ovens, and university students are trained in the production and use of biochar as a soil amendment

158. The project reported that 661 smallholders, farmers, resource managers, development agents, agricultural extension staff, researchers, B4SS project members, producers of biochar-making ovens, and university students were trained in the production and use of biochar as a soil amendment. The target as per the project logical framework was that at least 36 people should be trained. In this case, the project vastly outperformed on its intended output.

159. As an example of using international expertise, China had two (international) training sessions in 2015, and 2016. For Vietnam, during the B4SS mid-term review workshop, TNUS held an international biochar seminar (in 2017) which provided a valuable capacity building opportunity for the TNUS students (and capitalised on the expertise present for the mid-term review). In general, whenever scientific advisory panel members visited each country, small trainings coincided with these visits.[37]

160. In China, various trainings with farmers, government officials, businesses were conducted over the course of the project. Particularly, NAU conducted numerous training workshops and as a result have found that a pathway for large-scale biochar implementation in China is the value chain from converting crop straw into biochar to make biochar-compound fertilizers (this was also a result of the end-project survey of participating farmers).[38]

161. In Vietnam, several trainings were conducted, at university, and also predominantly on-farm. Local government and women leader groups were strongly involved in the organisation and coordination of farmers and extension workers for the training. The surveys conducted at the end illustrated that learning-by-doing was a much more effective learning experience (versus one session where they had more traditional presentation-style training).[39]

162. In Indonesia, trainings were combined with farm trials (as in the other countries), but also included visiting students, as well as the promotion of biochar within the BPTP (national agricultural extension), especially using the products developed through the project (the video and the cartoon).[40]

163. In Ethiopia, multiple trainings took place, both at the university, and on-farm, with farmers, extension officers, university staff, etc, including on formulations, as well as on producing biochar. Learning-by-doing was very important, and thus much one-on-one was also incorporated. In addition, and particularly one champion farmer, has carried on with show-and-tell training and support.[41]

164. In Kenya, the ParTriDes methodology was employed at the onset, and this contributed greatly to a more organic training experience (i.e. learning by co-designing). In addition, the demo site was set up at a school, which provided the opportunity for school learners and teachers to learn.[42]

165. In Peru, numerous biochar workshops were carried out in conjunction with farmer trials, as well as the dissemination of knowledge-sharing tools.[43]

[37] Review of project implementation documentation, as well as interviews with project respondents (July 2019).
[38] Review of project implementation documentation, as well as interviews, country visit (July 2019).
[39] Review of project documentation and interviews, country visit (July 2019).
[40] Ibid.
[41] Project documentation, interviews, country visit (July 2019).
[42] Project documentation, interviews with project proponents (July 2019).
[43] Project Workshop Report, and interviews with project respondents (July 2019).

166. In addition, in most countries, capacity was developed within project partners, as well as upcoming students and scientists in biochar (including through post-graduate studies, direct training, and exposure to experts, as well as co-publications).[44]

167. Delivery of outputs is rated as *Highly Satisfactory*.

Achievement of Direct Outcomes

168. The achievement of the project's objective, namely to "demonstrate and promote the adoption of SLM practices involving the use of innovative organic amendments, based on biochar, that improve the capture and efficient use of nutrients, and enhance productivity, improve climate resilience, support rural livelihoods, and contribute to watershed management" will be evaluated based on the two outcomes of the project.

Outcome 1: Increased understanding of the potential of biochar in improving productivity and addressing issues of declining soil fertility and mismanagement of nutrient resources

169. As per the logical framework indicator for this outcome, the final project report showed that 205 farmers participated in the evaluation of the effects of biochar in soil and supported the generation of useful information for sustainable land management (the Outcome-level Indicator target was 120).

170. Based on extensive interviews with farmers and other relevant stakeholders in three countries, as well as reviews of the project implementation documentation, there is a definite increase in understanding and appreciation of biochar's role in soil health and crop productivity.

171. Outcome 1 is an important step towards the intermediate state whereby enhanced use and access to greater information and good practices for biochar amendments leads to increased use of biochar application to enhance soil health in the pilot sites of the six countries in question. The project has certainly created a strong evidence base, and an understanding, which has led to increased use in each of the countries, the level of increased use depends on factors outside the control of the project. The project certainly helped to drive enhanced use and access through the strengthening of the farmer-local scientist, and local scientist-international scientist networks, as well as the connection between the scientific community and the practitioners, which resulted in co-learning for uptake.

Outcome 2: Knowledge generated and disseminated on the appropriate use of biochar to improve the capture and efficient use of nutrients, while reducing air and water pollution; and increased awareness and improved management amongst stakeholders on the use of biochar to address soil constraints, and most effective application rates and formulations to achieve agronomic benefits

172. According to the final project report, 1042 landholders, researchers, students and other stakeholders visited the demonstration sites (and/or were trained). This target outperformed on the outcome-level indicator by almost 10-fold (original target was 120).

173. The project also outperformed in the amount and quality of communication and outreach materials (videos, cartoons, posters, pamphlets, guides, etc), which are an important and valuable resource not only for the project countries, but also for other countries (e.g. other countries in South America are making use of the Peruvian-developed biochar videos).[45]

174. Training and capacity development, particularly through learn-by-do, participatory design, as well as exposure (students being able to join projects etc), had a large role to play in having this outcome come to fruition successfully.

[44] Evaluator observation based on review of project docs, peer-reviewed publications, and interviews (July 2019).

[45] Interviews with project proponents (July 2019).

175. Most project proponents especially highlighted the value of the knowledge sharing between countries and the support by the Scientific Advisory Panel.[46]

176. This outcome, as achieved through the project, will lead to the intermediate state that more informed farmers and users are able to (in some cases) make, and use, biochar for application. The assumption that biochar production is easy did not hold for the project, at least in some of the countries (Indonesia, Vietnam, China) where they would prefer to have easy access through e.g. biochar compost, or compound fertilizer. Championship and behaviour change for uptake will eventually lead to increased use in the six countries in question. This is an assumption that will further be elaborated on in the sustainability section, suffice it to say, that where championship (particularly farmer championship) was strong, uptake was stronger.

177. Achievement of direct outcomes is rated as *Highly Satisfactory*.

Achievement of Likelihood of Impact

178. The likelihood of achievement of overall impact, in the long-term, as a result of project outcomes achievement and causal pathways in the reconstructed Theory of Change, will vary from country to country, and depend on some assumptions being met.

179. It is the evaluator's opinion[47] that the intended outcomes were fully delivered, and there was certainly a process initiated through these outcomes that will lead to intermediate states. The drivers that highlighted relationship building and network generation – if these professional bonds are maintained – will have a large influence to drive the project towards impact.

180. It was found though that two elements are key in understanding how the project might eventually reach impact in the long-term, namely (1) level of championship among farmers, local and international scientists, and (2) the social dynamics in the countries in question, particularly as economies grow and farming becomes "less desirable" and traditional behaviours and their openness to change.

181. With regard to the level of championship, and related particularly to farmers, it was evident – particularly in a country like Ethiopia (and others, e.g. Indonesia as a farmer group of champions, for instance) – that change within a farming area among farmers will predominantly be driven by champions (specifically those farmers who are respected and trusted) who are able to showcase results. The level to which these champions are able to support the movement towards impact will depend on the platform they are given to showcase and share, and how they are incentivised and empowered in this process.

182. The evaluator found that biochar uptake needs to be seen within a greater agri-socio-economic system. In this sense, the move to impact will depend on many factors, including those within the control of the project respondents, and those which are not. A good example here is Vietnam (although in many cases this is reflective of a situation in all countries): economic growth, and in some cases infrastructure development (e.g. new tar road, factories being built needing workers) the project area (ChoiMoi District) have led to a decrease in interest in farming. So, as a result, of the younger generation, only 10% are in farming; there is a move to work in (in the case of this are in particular) the Samsung factory nearby. As a result, the older generation are kept to farm, but also to take care of the children and the household. As this work is devolved mainly to women, responsibilities are piled up. Yield from cops do not bring in as much revenue in relation to other jobs (small shops and business, for instance), and so there is a shift away from intensive input into the farm that focuses on sustained soil fertility. Effort to produce biochar in this case does not equal reward to the average farmer. While women's groups in Vietnam highlighted the benefits of biochar, and at an individual level, they continue to apply it in their home vegetable gardens;

[46] Interviews with project proponents (July 2019).
[47] Based on extensive interviews, discussions, field visits in-countries, as well as implementation documentation review.

they do to a much lesser extent in their rice paddies or maize fields. If it was easily available to buy (and in the same range of cost as chemical fertilizer) they would purchase it.

183. This above example merely illustrates the social dynamics, and while this example cannot be blanketed in all countries, it certainly is the case for China, Indonesia and Peru too.

184. In the case of Ethiopia and Kenya there is still interest in making biochar at small scale, but again this depends on the social construction of the farm. In some cases (e.g. Ethiopia), where women have led, changes in their marital status or other responsibilities have meant that they are not able to continue biochar application; in the case of the champion farmer here, a setup of multiple sons and additional available land has ensured space and labour for the farmer, and has thus allowed patience and return on investment with regard to biochar application. But Jimma town has also developed and encroached more and more onto farming land, which lends itself to a transition from farming to other employment. This transition will also have implications on the move to impact.

185. In other contexts, it was highlighted by project proponents that behaviour change takes time, especially if farmers and extension officers are attached to their traditional methodologies (and in this case, long-term fertilizer use). This will only change as land productivity changes as a result of biochar application on near-by farms (e.g. in the case of Ethiopia, the change in productivity over a few years is very visible to other farmers and has sparked increased interest and willingness to copy and learn from the champion farmer).

186. With the above in mind, and if there is external influence (outside of the project) back to appreciation of small-scale farming (in line with the SDGs) in some countries, and more sustainable methods in large-scale farming, impact will be reached – but how fast it will be reached will depend on some project-level interventions, particularly a focus in uplifting champion farmers and other champions (e.g. local government), and whether in some countries (e.g. Indonesia and Vietnam) a value chain will be supported to catalyse production and consumption of biochar.

187. Overall, the project did well to achieve its outcomes, and all it could do to move to impact, but there are some external social considerations that the project does not have control over that will affect the eventual move to impact. Those under the project's control, the evaluator is confident the project respondents are able to continue to support in the wider SLM landscape.

188. Achievement of likelihood of impact, as directly connected to what the project is able to control, is *Highly Likely*.

Rating for Effectiveness: Highly Satisfactory

E. Financial Management

Completeness of Project Financial Information

189. The project's financial management is as complete as it can be within the requirements of financial reporting for the time period it was in (i.e. the requirements of GEF/UNEP reporting). The project has a high-level budget by funding source, as well as regular quarterly reports, a final expenditure sheet. The detailed project budget was developed in the old GEF/UNEP financial reporting template and thus reporting was only per budget lines (i.e. administration, contracts, training, premises and equipment, etc) and thus there was not reporting at output level, *per se*.[48]

[48] Review of financial documentation and email interview with FMO.

190. Co-financing was reported in detail, both for in-kind and for cash. Additional co-financing was secured during implementation, and this was also well reported (through a final co-finance report).[49]

191. Audit reports were provided for the project by the main project partner (i.e. Starfish Initiatives).

192. There was a slight revision to the budget in 2016, but this was quite minimal, and did not affect project implementation. The main reasons for this revision was due to (a) reductions in staff costs, and (b) exchange rate changes.[50]

193. Tables of financial expenditure to budget, as well as co-financing, can be found in Annex 3.

194. Completeness of project financial information is rates as *Highly Satisfactory*.

Communication Between Finance and Project Management Staff

195. Communication between the Task Manager, the Project Director, and the FMO was regular, and the FMO was regularly connected when financial reports were received from partners or when a financially-related question was asked by one of the partners.

196. One no-cost extension was made for the project, and the amendment documentation is in order. The amendment was only to extend the completion date (to allow for finalising of field trials, which were started later on account of project being started later).

197. Financial delays were experienced by the project, and this was connected to the Umoja system. For some project partners, this was not felt due to these institutions having enough financial liquidity (i.e. being able to "borrow" finances from other projects, or having buffer finance). However, those who did not have such liquidity and depended on timely disbursement, were affected for a time period and this caused much discomfort for Executing Agency, who were in charge of further disbursing funds to the partners. Communication was generally good, as there was extended communication between UNEP and the Executing Agency, including legal letters, and the delay in funding represented a potential risk to the Executing Agency's ability to achieve project results. Despite this, broader implementation and the achievement of results was not affected.[51] Delays are generally more attributed to efficiency (F: Efficiency) and not necessarily to communication and financial management.

198. Communication between finance and project management staff is rated as *Satisfactory*.

Rating for Financial Management: Highly Satisfactory

F. Efficiency

199. *Time:* The project was initially set to begin in July 2014, but actually only started in April 2015. Delay attributed to timing to fit the growing season, delay in the recruitment of the Project Director, delay in payments, change in partners (Peru). It was extended both because it started late, but also because to accommodate some of the fieldwork delays (due to environmental e.g. flooding, pests etc, and other delays). Funds disbursements were delayed due to the Umoja system. It was supposed to be completed by April 2017, but was extended until December 2018. Linked to the financial management and communication (E. Financial Management), funds disbursement delays on account of the Umoja transition could have risked implementation achievements of the Executing Agency, but did not end up affecting project results achievements.

[49] Ibid, including interviews with other relevant project respondents.
[50] Email communication with UN Environment project management team.
[51] Review of legal letters between Project Partners and UN Environment about financial disbursement delays, as well as interviews with project respondents (July 2019).

200. *Cost-effectiveness:* the project budget in relation to what was aimed to be achieved at project development was realistic. What was eventually achieved was multiple-fold, and is testament to the level of ownership and championship among project partners, the level of coordination of the project director, and additional co-financing secured. Roughly USD 30,000 of the final budget was not spent, it would be a shame if it were returned, instead of being used to perhaps forward some of the recommendations coming out of the Terminal Evaluation.[52]

201. Overall, it is commendable what was achieved in this MSP, given the time, and budget. However, delays could have been prevented with effective planning (e.g. growing season start of implementation, recruitment, administration and funds disbursements) and stakeholder capacity assessments in project design.

Rating for Efficiency: Satisfactory

G. Monitoring and Reporting

Monitoring Design and Budgeting

202. Monitoring (and its budget) at design stage could have been improved in only one way: outcome-level indicators could have focused on measuring deeper impact (i.e. behaviour change) rather than focusing merely on the number of participants exposed to trainings etc. Other than this, generally, the M&E plan (and its reporting specifically) was well-laid out in the project document, with aligned budgets.

203. Monitoring design and budgeting is rated as *Satisfactory*.

Monitoring of Project Implementation

204. Monitoring was conducted as laid out by the project document, but was improved on in the following ways: (a) continuous learning and sharing of project implementation throughout the project allowed for flexibility and adaptiveness in project implementation (especially with regard to the technical aspects of the project), and (b) a Mid-Term Review workshop was a key contributor to this adaptiveness – and allowed for the project participants to share and take up results and make any changes necessary (i.e. allowed to improve direction of experiments and field trials based on direct face-to-face feedback at the meeting).

205. Monitoring or project implementation is rated as *Highly Satisfactory*.

Project Reporting

206. Half-yearly progress reports were developed throughout the project lifespan.[53] Country technical reports were to be submitted twice yearly; this was highlighted by some project respondents as arduous.[54] The inception and mid-term workshop reports were strong resources for learning and monitoring progress at country level (in terms of process). The final project report included detailed lessons learnt and recommendations for further uptake.[55]

207. Project reporting is rated as *Satisfactory*.

Rating for Monitoring and Reporting: Highly Satisfactory

[52] This is according to the final quarterly expenditure statement of 2018.
[53] Review of half yearly progress reports of B4SS project.
[54] Some stated that one technical report would have sufficed, that two reports were very time consuming, and the templates created for the reporting process were not helpful or user-friendly. (Interviews with project respondents, July 2019).
[55] Review of progress reports and related project implementation documentation.

H. Sustainability

Socio-political Sustainability

208. Socio-political sustainability of the project results varies from country to country. However, because of the success of the field trials, and the strength of the project partners (in some cases this strength was built through the project), and the involvement of government stakeholders throughout the project, in most countries results will be sustained to a degree.

209. In Vietnam, local government and women's groups were strongly involved throughout the project, particularly in organising and convening the community for the training and for demonstrations. The local government continue to have monthly meetings where biochar is included in the deliberations. However, social dynamics, as mentioned under the impact section above, risk the long-term impact of the project. Labour resources in the villages are low as a result of farmers preferring to move closer to the new tar road. There is a decrease of people in agriculture generally, more income is earned from working in the factories. This social trend is uprooting the more traditional small-scale farming and might have implications on how farming is practiced in this area and others in Vietnam. There was a similar case for this in Jimma, Ethiopia, as the town is growing and encroaching into farmland. China and Peru, similarly, as the economies have changed, more income is made in other work, and thus small-scale farming – and the increase in yield as a result of high effort application of biochar – is insubstantial in many cases.[56]

210. In Vietnam, the inclusion of women's leader groups was an important step in driving the social sustainability of the project, particularly in the context that women are driving the households and have strong social connections for further spread in the project areas. The project became quite famous among the other homesteads in the area, as a result of the coordination of all the women's groups in the area – which has resulted in further social spread.[57]

211. In China, the case for socio-political sustainability is very strong because (a) NAU has been working on biochar and involving government and business since 2009, and (b) there are top-down directives from government incentivising biochar application. This has resulted in a value chain of producing and consuming compound fertilizer. The government has policies to reduce chemical fertilizer (by 10%) and the stopping of open-burning straw on-farm (which means they have excess agri-waste that needs to be removed somehow – biochar gives a clean circular technology to deal with this waste and return it back to the soil). The future for biochar in China is large-scale production for large-scale farming. In the near future, the value chain for compound fertilizer is still new, so chemical fertilizer is still cheaper. However, as government continues to incentivise the substitution of chemical fertilizer with more environmentally sustainable amendments, the value chain for biochar and compound fertilizer will improve and take over.[58]

212. In Indonesia, agricultural extension and local government were involved in the training as well as the dissemination of information materials. The ISRI continues to campaign for biochar as a technology to improve agricultural land, and in some cases, e.g. in the Lamongan District, the local government is interested in supporting the technology spread. The Indonesian government funded the training of farmers in Central Java, Central Kalimantan, Bima/NTB, East Lampung and East Java. This shows that there seems to be sufficient government involvement to ensure first steps toward biochar integration into appropriate areas. However, the efficacy of biochar depended here on the interest of farmers and the context of the area (soil, effort, etc). Given this, and the limited financial sustainability (discussed further below), the spread will be slower than if there was further intervention.[59]

[56] Interviews in-country (July 2019).
[57] Ibid.
[58] Ibid.
[59] Ibid.

213. In Ethiopia, as in many countries, the growth of young professionals in the area of biochar will continue to ensure sustaining of research in biochar in the country. In terms of government ownership and sustaining of results, extension officers were involved from the beginning. As a result, the Ministry of Agriculture have integrated biochar into their "soil health" programme, development agents (i.e. extension officers) are stationed at each village (3 development agents per 7,000 farmers). In addition, what will really sustain and further upscale biochar application is the championship of farmers (in the case of this project, one particular champion). The more champion (or lead) farmers are empowered, the more the project results will be sustained.[60]

214. In Kenya, the participatory methodology helped to enhance farmer ownership, and this will continue to sustain through the farmers involved in the project. However, the issue in Kenya is the difficulty in acquiring the materials for biochar (the project had to buy sugarcane waste from a nearby factory to make it for the project). There was an attempt to involve government, but during the time of the project there were elections, and the sub-chief in charge of the area did not end up playing a critical role in the project. This said, the project might continue in a more institutionalised setting because of the long-term set up of the watershed programme in the area.[61]

215. In Peru, there has been a lot of effort by the project partners to integrate national and local government for sustaining of results. To some extent the project is continuing (at least at municipal level) through government involvement. In terms of social spread among farmers, it is similar to what was already mentioned for Vietnam – the effort of biochar versus the financial reward is low, and so while farmers appreciate the benefits of biochar, it is not likely that there will be wide spread unless biochar is supported within a larger value chain.

216. Socio-political sustainability is rated as *Likely*.

Financial Sustainability

217. Generally, with the exception of China, financial sustainability is the biggest limiting factor for the project. In most countries, however, thanks to the championships of the institutions involved and the continued technical support of the Scientific Advisory Panel members, results will be sustained financially to varying degrees.[62]

218. In Vietnam, little to no financial sustainability exists, other than a few projects and research with the TNUS at a very small scale (in fact, as described more below, TNUS has a much smaller role in biochar than when it first started with the project). In the project sites, the biochar application is continuing at small scale, with local government and with farmers and women's groups, but with no dedicated budget. There is also limited to no support to incentivising a value chain for biochar production and consumption (i.e. medium scale business). Some businesses exist, but they are struggling to get off the ground.[63]

219. In China, financial sustainability is ensured both for the NAU, and also in terms of government support to the value chain.[64]

220. In Indonesia, there is no external funding and no secured funding. However, little by little, there is government interest building. But institutional funding, in terms of ISRI, is limited and project activities will likely not continue in the same vein as during the project.[65]

[60] Ibid.
[61] Ibid.
[62] Ibid.
[63] Ibid.
[64] Ibid.
[65] Ibid.

221. In Ethiopia, Jimma University continues with its research "borrowing" budgets from elsewhere for now, and generally also have some small funds secured to continue. There is little direct involvement with farmers after the project ended, but with biochar being taken up into the national extension system, there will be continued financial support to farmer extension on biochar.[66]

222. In Kenya, the long-standing watershed programme will continue, and to a lesser extent the biochar that has already been taken up by the farmers. Financial sustainability will continue for some aspects of the project.[67]

223. In Peru, with continued pushing and championship by the project partner, local government and business is pulling in to support the biochar value chain. This work is also continuing to spread slowly into other countries of South and Central America.[68]

224. Financial sustainability is rated as *Moderately Likely*.

Institutional Sustainability

225. Institutional sustainability is particularly strong in China and Ethiopia, with the respective universities continuing the championship of biochar and working with government to continue the spread.[69]

226. In Vietnam, unfortunately there was staff turnover and this caused a decreased interest in biochar at TNUS.[70] Institutional sustainability will unlikely be kept at the university in the near future. Efforts are more likely to continue through local government and farmer and women's groups.[71]

227. In Indonesia, NGI left at project closure, and ISRI has limited funding to continue. However, the capacity was developed among researchers and has elevated scientists in ISRI to further champion biochar. ISRI continues to work with local government to integrate biochar into agricultural programmes.[72]

228. In Ethiopia, the project coordinator moved to another University, and is continuing some work on biochar through this university. Jimma University continues to conduct research on biochar, and as mentioned previously, a new generation of biochar scientists are coming up.

229. In Kenya, institutional sustainability will be vested through the watershed programme only (and biochar is not their main direction).

230. Overall, at the international and regional levels, there are sufficient networks, including IBI, IBI-Asia (both of which are more institutionalised) and the Africa Biochar Partnership (institutionalised but lacking funding and therefore not really moving forward), to support general institutional strengthening and mutual support.

231. Institutional sustainability is rated as *Likely.*

Rating for Sustainability: Moderately Likely

[66] Ibid.
[67] Ibid.
[68] Ibid.
[69] Interviews with project respondents, in-country visits.
[70] For instance, the key project partner now no longer works at the University and is not working in biochar research anymore, due to the lack of financial sustainability.
[71] Interviews with project respondents, in-country visits.
[72] Ibid.

I. Factors Affecting Performance

Preparation and readiness

232. The project document clearly outlined the appropriateness of the choice of the six countries with detailed descriptions of country situations, baselines and readiness for the project. A stronger capacity assessment of project partners at project design may have helped avoided some of the partner changes that incurred during project implementation.

233. The logical framework (with the exception of outcome-level indicators) was sound and was realistically measurable and achievable. Activities were built on previous foundations and thus the results framework was realistic and lent a strong point of departure to the project.

234. Risk identification and safeguards presented in the project document were satisfactory. The project was designed with flexibility which allowed the project partners to be able to adapt if risks (particularly in the field designs and experiments – external environmental factors) presented themselves.

235. Governance and implementation structure was well laid out in the project document.

236. Generally, most respondents felt that the project was too short to properly get results (two seasons) for biochar application.

237. Given the above considerations, Preparation and readiness is rated as *Satisfactory*.

Quality of project management and supervision

238. The project was implemented with the overall framework outlined by the project document. It was implemented by UNEP Ecosystems Division, executed by Starfish Initiatives, with strong (at least, by mid-term) partners on the ground in each country, with scientific and technical oversight by the Scientific Advisory Panel. UNEP was well placed to support overall facilitation and administrative supervision.

239. There were two partner changes (Peru and Indonesia), which have already been discussed in detail in previous sections of this report. It is the evaluator's opinion that the project management team did a commendable job, under the circumstances, to find appropriate partners who ended up successfully implementing, and contributing co-finance to the project.

240. The governance structure was extremely well implemented in this project, roles and responsibilities were well-laid out, and the evaluator cannot think of a better way to have structured project implementation.

241. All project respondents highlighted the effectiveness, efficiency, and support of the project director. All project respondents also highlighted the importance of the three workshops (inception, mid-term and end-term), as well as the support of the scientific panel, in improving their implementation capacities. Capacity development for project partners was not envisaged at project design to be a big component of the project, but it turned out that this was one of the most successful unintended outcomes of the project.

242. Some project respondents (country partners) suggested that a more concrete and longer-term visit by the members of the Scientific Advisory Panel at the onset of the project may have further improved the scientific integrity of the trial designs and avoided some mistakes that were made in the first season.[73]

243. The Scientific Advisory Panel seemed to go out of its way to support project implementation, much more than was envisaged at the onset of the project. This included regular visits to the countries, technical advice through various skype and other communications, and multiple

[73] Interviews with country partners (July 2019).

iterations and reviews of country-level technical reports. Their role was integral to the project's success.

244. Project management and supervision is rated as *Highly Satisfactory*.

Stakeholder participation and cooperation

245. The B4SS had various target groups, but the primary one was the farmer. These were key beneficiaries of the project and were involved throughout the project. Perhaps the best practice example of enhancing farmer ownership and championship was Kenya's ParTriDes methodology[74]. In Ethiopia, farmer participatory methods were also employed which, in the evaluator's opinion, created the platform for champion farmers. This was also evident, to a lesser degree, in Vietnam.

246. Another key target group was the extension support of agriculture at government level. In all six countries an effort was made to include and integrate this stakeholder into the project activities, with varying success. In Kenya, this was not as successful, as an example, as in Ethiopia.

247. A key (unintended) stakeholder in the project was the student. Because most country partners were universities, or at the very least, research-based institutions, students were involved throughout the project. This included training, exposure to the Scientific Advisory Panel members, supporting project outcomes through individual Masters and PhDs, co-publishing with their supervisors, and more. In some countries, e.g. Indonesia, students who were not directly studying biochar-related thematic areas, were exposed to on-farm training and continued sharing what they had learned (even at household level with their parent-farmers). In many cases, the project, through its relationships fostered, allowed for several students to pursue their PhD and Post-doctorals (and continue to do so). This is a key (unintended) outcome of the project – the catalysing of a new generation of biochar scientists.

248. The business community was a target group in some countries more than others, most particularly in China, and to a lesser extent, in Peru. In China, the large-scale operation lent itself to supporting the large-scale value chain of biochar – compound fertilizer production. Business was a key player in this regard.

249. Partnerships were extremely important, and relationships forged and strengthened through the project have turned into life-long professional collaborations. Most respondents highlighted that this was one of the key successes of the project – the strengthening of these relationships for further collaborations and biochar uptake.

250. Stakeholder participation and cooperation is rated as *Highly Satisfactory*.

Responsiveness to human rights and gender equality

251. The project, in its design, laid out the project implementation in its responsiveness to human rights and gender equality. The project aimed, through its research, to improve lives for farmers and in general, food security.

252. In some countries, the project was able to strengthen and empower women farmers (particularly in Vietnam) through the project implementation activities. In other countries, the project did well to empower women scientists (e.g. in Indonesia).

253. The project seemed to be very self-aware of the gender-differentiated roles within the countries, and the biochar application and uptake had differing results because of these roles. For instance, in Vietnam, women farmers felt that they were not equipped to deal with the intensive

[74] Participatory Trials Design Methodology can be found here https://biochar.international/guides/participatory-trials-design-partrides-methodology/

labour needed to collect and apply biochar. In Ethiopia, women had many other responsibilities, and as a result there were differing levels of uptake between male and female farmer demo plots.[75] These were discussed in detailed and reflected on in the various discussions held during the international project workshops.

254. Responsiveness to human rights and gender equality is rated as *Satisfactory*.

Country ownership and drivenness

255. In all countries, championship (in some cases at the institutional level, but in most cases at the individual level) was very strong in terms of project implementation and resultant sustaining of results. Government involvement was strong in most countries as a result of having them involved from the onset.

256. In Vietnam, local government was involved, particularly in convening the farmer and women's groups, and their (continued) support in the project contributed to its successful implementation.

257. In China, the NAU have been working very closely with government, and government in general has been very enthusiastic to support biochar as a technology to reduce chemical fertilizers and deal with many environmental and soil health problems in China. The project also supported the elevation of this initiative, allowing China to position itself in a global space and empowering the country to take a leadership position.

258. In Indonesia, local government was involved in the trainings and dissemination of the materials and are starting to take on the results of the project.

259. In Ethiopia, government absorbed the project and biochar methodologies into its agricultural extension programme.

260. In Kenya, government did not play a critical role, even though they were involved in the project. During this time, there seemed to be more focus on the elections.

261. In Peru, through the championship of the project partner, the government was brought on board and continued communication and integration is strengthening government ownership slowly, at least at municipal level.

262. Country ownership and drivenness is rated as *Satisfactory*.

Communication and public awareness

263. Communication was a strong component and result of the project, mostly due to the Project Director's (and country partners) tireless work on supporting the development of, and developing, countless materials for wider consumption.

264. Successes of the project, and generally the project, as a case study of a good SLM project, has been showcased on GEF and UN Environment platforms, among other international platforms. In addition, it was also encouraged to apply for the Global Climate Action Awards under the Momentum for Change of the UNFCCC.

265. Videos, briefs, pamphlets, posters, cartoons and much more was developed through the project and made widely and freely accessible on the website. Most of the project respondents relayed that this was a key contributor to sustaining results of the project and creating a larger platform for continued learning and uptake of biochar.

266. In some examples, these materials have already been used to spread biochar into other countries (as an example, in South America, using the videos produced through Peru).

[75] Interviews and country visits (July 2019).

267. The website and B4SS branding is envisaged to be continued to be used in the IBI network.

268. At country level, in all countries, communication and materials were a strong factor to project implementation success. In all countries information brochures were widely disseminated. In some countries, e.g. Ethiopia, radio and TV programmes were broadcasted. In many countries, including Vietnam, Ethiopia, Indonesia and Kenya, information packages were translated into vernacular languages.

269. Broader training programmes (i.e. not only for the key target audiences, but also wider) were implemented in some countries, e.g. China, where international training programmes brought in additional countries for wider learning.

270. Communication and public awareness is rated as *Highly Satisfactory*.

Rating for Factors Affecting Performance: Highly Satisfactory

VI. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

271. The B4SS project has been used as a flagship in both UNEP and GEF platforms with regard to innovations in SLM and climate change mitigation. It was a great example of integration of scientific rigour and SLM innovation and social spread in agricultural communities in six countries around the world. The six countries were well-chosen and provided a diverse testing ground to biochar application in different contexts and allowed for a strong south-south learning approach throughout the project implementation.

272. The project was designed as research-action project. In all the countries, foundations for biochar had already been laid, and the key question is what would have happened if the project had not existed – would the same results have been achieved organically? The short answer is no. The project created a platform of sharing and connections between biochar actors around the world that would never have had the opportunity to share results and learn from each other. This not only provided an opportunity to learn and take up the learnings in their own country contexts, but also to strengthen professional bonds and catalyse change more rapidly within the SLM-biochar area. The key strength of the project is in the forging and strengthening of these relationships, and the level of commitment of the partners to attain and sustain project results.

273. The project overachieved on all its outputs, and in most outputs, delivered more than 10-fold what was envisaged at project design. This was, again, a testament to the project partners' commitment to the project, displayed both in co-finance commitments, but also in ownership of project implementation, and championship. As highlighted by all project respondents, the project director should be commended for the coordination of this effort, and the overall success of the project.

274. The good practice guides, as well as other important informative materials and videos that were developed in the course of the project implement have been made easily available on the biochar website, and there has already been evidence of uptake and use of these. These are a valuable resource not only for the implementation countries, but also for other countries (e.g. the Spanish videos developed by Peru have been used as a resource in other South American countries). Capacity-development and training programmes were interwoven with the development of these materials and thus their use became very applicable.[76]

275. The project design and TOC reflect well the overall aim and impact of the project, especially under the context of having to implement under a diverse set of circumstances (geographical variation, contextual variation, methodological variation, etc). The results and lessons from the project have been widely shared with key stakeholders, and especially government stakeholders, in most countries, were involved from the onset of project implementation.[77]

276. Partnerships and collaborations with stakeholders were highly effective in this project, and in most countries, uptake by government extension services will take place (particularly, in e.g.

[76] See evidence and further description of development and uptake under D. Effectiveness, Achievement of Project Results, particularly under Outcome 2, paragraphs 173-189, and 194-199; this paragraph speaks specifically to the strategic evaluation question "To what extent have the good practice guides on SLM technologies been disseminated in each participating country?" See paragraph 105 under II. Evaluation Methods for the set of strategic questions.

[77] See evidence and further description of suitability of project design and stakeholder participation and ownership under D. Effectiveness, Achievement of Likelihood of Impact, paragraphs 200-210, and H. Sustainability, Socio-political sustainability, paragraphs 230-238, and Institutional sustainability, paragraphs 247-253; this paragraph speaks specifically to the strategic evaluation question "To what extent are the project design, TOC and results framework suited to a project that encompasses six pilot country interventions? What evidence exists to suggest that the results, lessons and experiences generated by the project are ready to be scaled up or replicated?" See paragraph 105 under II. Evaluation Methods for the set of strategic questions.

Vietnam, Indonesia, China and Ethiopia). Farmers and local government were highly involved (and in many aspects took ownership of the project especially with regard to sustainability of results). The project also had a strong influence over students and increasing capacity of researchers and students, i.e. building a new generation of biochar experts locally, nationally, and globally.[78]

277. The level of championship was a strong contributor to project success, and it must be highlighted that gender played an important component in some countries (e.g. women farmers in Vietnam). The project was able to strengthen and empower women farmers and women scientists. In Vietnam, the strength of social organisation and structure (coordination, set-up of women's groups, regular meetings, etc) was a strong contributor to project results achievement and further sustainability.[79]

278. Biochar should be placed within a bigger system of SLM and agriculture, which in turn is placed within a system that interacts with the social and economic dynamics. Unfortunately, these social and economic dynamics are moving towards unsustainable futures which need to be shifted using bigger leverage points not under the control of the project. However, the leverage points for biochar lie within four main areas, namely (a) the farming community, and their willingness to apply biochar, and this varies from country to country in terms of who farms, what farming practice takes place, and the social dynamics at play, and (b) the local government extension, (c) business and the value chain for biochar, and (d) scientists, and how they interface with the previous three.

279. As a result, achievement and move to impact will depend on external factors, but in the opinion of the evaluator, will come to fruition. In terms of sustainability, this move (if left to its own devices, i.e. no external intervention in countries) will be slower. Some interventions might be necessary to catalyse the move to impact. These are further discussed below.

280. Overall, the key achievements of the project include its results framework achievement, the strengthened professional relationships, the quality and quantity of information materials developed and disseminated, the visibility and platform for biochar as a result of the project, and the uptake and improvement of (many) farmers' lives as a result of being exposed to biochar.

281. The table below provides a summary of the ratings and finding discussed in Chapter V. Overall, the project demonstrates a rating of **Highly Satisfactory**.

[78] See evidence and further descriptions under D. Effectiveness, Achievement of Likelihood of Impact, paragraphs 200-210, and H. Sustainability, Socio-political sustainability, paragraphs 230-238, and Institutional sustainability, paragraphs 247-253, and more notably I. Factors affecting project performance, Stakeholder participation and cooperation, paragraphs 267-272, and Country ownership and drivenness, paragraphs 277-284; this paragraphs speaks directly to the strategic evaluation question "What has been the degree of effectiveness of partnership collaboration with stakeholders? Are government officials aware of the project outcomes – what are the opportunities to engage with more stakeholders?" See paragraph 105 under II. Evaluation Methods for the set of strategic questions.

[79] See evidence and further descriptions under I. Factors affecting project performance, Responsiveness to human rights and gender quality, paragraphs 273-276; this paragraph speaks directly to the strategic evaluation question "To what extent was a customized gender sensitive approach adopted for selecting and involving farmers and researchers? What effect did this have on the project outcomes, if at all?" See paragraph 105 under II. Evaluation Methods for the set of strategic questions.

Table 4: Summary of project findings and ratings

Most criteria are rated against the following on a 6-point scale: Highly Satisfactory (HS); Satisfactory (S); Moderately Satisfactory (MS); Moderately Unsatisfactory (MU); Unsatisfactory (U); Highly Unsatisfactory (HU); Nature of External Context is rated from Highly Favourable (HF) down to Highly Unfavourable (HU); Sustainability and Likelihood of Impact are rated from Highly Likely (HL) down to Highly Unlikely (HU).

Criterion	Summary assessment	Rating
Strategic Relevance	The B4SS was highly relevant to UN Environment MTS 2014-2017 and POW 2014-2015 within its Ecosystem Programme, and the LD targets of GEF-5. Very relevant to global priorities vis. the SDGs. Project highly relevant to country priorities.	**HS**
Quality of Project Design	Generally, the project was well-designed, especially in terms of governance and country-level implementation. Built well on previous foundations and linking with other projects. Project designed very efficiently. Stakeholder analysis and partner capacity assessments could have been improved. Outcome-level indicators in logframe could have been better	**S**
Nature of External Context	Risks well laid out and mitigation strategies in place. No large conflict-related risk. Environmental challenges may have influenced project results – but these were mitigated for.	**F**
Effectiveness	Overall, given the project achievements and the effort placed by project partners to sustain results and move to impact, a testament to the level of commitment.	**HS**
1. Delivery of outputs	*The project vastly overachieved on its outputs multiple fold. Given the limited budget, this is a testament to the level of ownership and commitment to the project by the project partners.*	*HS*
2. Achievement of direct outcomes	*Outcomes were well achieved through the project, and certainly there has been move already along the causal pathway towards the intermediate states.*	*HS*
3. Likelihood of impact	*The project did all it could, and project partners will continue doing all they can, to move towards impact. Some external forces within the system might be out of project control.*	*HL*
Financial Management	Overall, financial management sound in the project.	**HS**
1. Completeness of project financial information	*All documentation in order, everything well documented with the exception of output level expenses – but this was not part of the template reporting during project implementation and the project cannot be penalised for that.*	*HS*
2. Communication between finance and project management staff	*Generally good communication, some improvements could have been made vis. the communication regarding the Umoja system.*	*S*
Efficiency	Project was extremely efficient given its limited budget and time. Mostly due to the level of commitment by all project partners, and willingness to co-finance, led to much higher success than anticipated at project design. However, delays in project due to various reasons meant a no-cost extension to the project, which in the evaluator's opinion, could have been averted with better project planning and administrative preparation.	**S**
Monitoring and Reporting	Generally, well planned out, adaptive.	**HS**
1. Monitoring design and budgeting	Well-laid out in project document, outcome-level indicators in the logframe could have been improved.	*S*
2. Monitoring of project implementation	Strong monitoring and self-reflection throughout project, with constant improvement and adaptiveness. Other projects can learn from this project.	*HS*

Criterion	Summary assessment	Rating
3. Project reporting	Project reporting well done and very comprehensive. Some project partners claimed reporting was too time consuming.	*S*
Sustainability	Generally, mostly due to the level of championship among the project partners, results will be sustained to varying degrees in each country.	**ML**
1. Socio-political sustainability	*Generally, strong government support to sustaining results, but social dynamics might influence move to impact.*	*L*
2. Financial sustainability	*Financial sustainability stronger in some countries than others. Most countries, financially limited to catalyse results at a speed necessitated by Agenda 2030.*	*ML*
3. Institutional sustainability	*Institutional strength good in some countries, e.g. China, Ethiopia, less so in Vietnam, Peru. However, government support strengthening in some countries (e.g. Vietnam, Indonesia).*	*L*
Factors Affecting Performance	Really good implementation of a limited project in budget and time. Generally well prepared, strong implementation and coordination structure, quality of commitment strong, level of country ownership depends on stakeholder championship and other forms of sustainability (social, financial).	**HS**
1. Preparation and readiness	*Project document clearly outlined the appropriateness of the six countries involved. Logical framework sound, outcome-level indicators could have been improved. Implementation structure well outlined.*	*S*
2. Quality of project management and supervision	*Project was very well implemented – implementation structure very strong. Two partner changes – this was well executed with high levels of adaptiveness – and worked out for the best for the project results attainment. Key strengths – project director, Scientific Advisory Panel, country level championship.*	*HS*
3. Stakeholders participation and cooperation	*Strong partnerships and cooperation forged through the project.*	*HS*
4. Responsiveness to human rights and gender equity	*Generally, project was reflectiveness in its approach to gender and human rights.*	*S*
5. Country ownership and driven-ness	*Strong levels of country ownership in terms of country partners, government and other stakeholders varying levels of ownership.*	*S*
6. Communication and public awareness	*Communication and outreach particularly strong in this project, outputs and comms materials really good. Strong publicity for project on various platforms.*	*HS*
Overall Project Rating	**The project overachieved greatly on its outputs, achieved its outcomes, and notably, achieved some unintended outcomes fit for move to longer-term impact. Move to impact will depend on external factors. Overall, well implemented, strong implementation structure. Some improvements re sustaining of results can be made through the recommendations of this report.**	**HS**

B. Lessons learned

282. The project, through its final reporting, and its final workshop report, has already drawn out very good lessons and recommendations for the project (including technical ones). This evaluation agrees with all of these, and does not wish to duplicate them here. As a result, the lessons and recommendations should be read in conjunction with those coming out of those two reports. However, the evaluation threads out the key elements (a synthesis, so to speak), and makes a few additional recommendations.

283. The following lessons are a result of intensive discussions with project partners. They are meant to be useful for future project design and implementation (GEF/UN Environment, in the three

main areas: LD, BD, CC), as well as useful for project partners in their continued work in biochar application.

Lesson 1: Championship is key to project results attainment and sustainability, catalytic role and replication

284. This lesson can be taken in two contexts, namely (1) champion farmers, or lead farmers, who allow for social spread more rapidly as they have trust and respect in their communities, and (2) champion project partners, whose commitment goes beyond tick-box project implementation, and often results in a much higher and more impactful project.

285. In relation to champion farmers, the project was clear – and Ethiopia is one of the strongest examples here – that farmers follow other farmers (they see success, and they become willing to replicate). The lead farmer approach has been used several times in many SLM-related projects. It is important, in any project, to create an enabling environment for champion farmers to develop and lead, and then investigate how best to support, empower, and measure the impacts of their innovation and dissemination abilities to ensure the highest level of sustainability and uptake of any innovation. In Vietnam, championship through women farmers, and most notably, women farmer groups made a strong impact due to the strong organisational structure and process of women's groups in the implementation areas (and this spread to more homesteads because of regular meetings and sharing among the women's groups). This also speaks to strong organisational and social structures within champion farmers as important contributors to social spread of technical innovations.

286. Connected to strong championship among project partners is not something that is generally easy to connect into project design. This is because social bonds and deeper connections (purpose) to any thematic area of sustainability (in this case biochar and how it fits into SLM) is not generally easily measured at project design. It helps if there are foundations already laid in countries (like was the case in this project). Generally, those who are committed with greater purpose to their area of expertise, will place much more emphasis on achieving outcome.

Lesson 2: Capacity development throughout project through exposure can create strengthened ownership and abilities to sustain results

287. This is true particularly in the case of strengthened capacities of project partners through the implementation of the project (in some countries more than others). It was an unintended outcome that project partners would have their capacities (in scientific design, reporting, implementing projects) strengthened. In some cases, country-level scientists were greatly empowered through their exposure and forged relationships with the top scientists in the field.

288. Another strong lesson is the involvement of students in a project like this. Many students were able to rapidly increase their own capacities through the exposure to the project (through PhDs, Masters, smaller undergraduate programmes, co-publishing, training, on farm support etc). This was a direct result of the project including universities as implementers in this particular project. This has ensured that in most countries, there is a growing and upcoming network of biochar-related scientists.

Lesson 3: Being as participatory as possible and co-designing with farmers has the potential to improve design and increase uptake

289. The ParTriDes approach by ICRAF in Kenya, i.e. involving the farmers and other key stakeholders which influence directly or indirectly SLM decisions was a critical success factor in the country and contributes to the sustaining of results. Having farmers be actively involved in the design of the project strengthens ownership. Farmers are the ones who understand their challenges the most, and having them own the solutions through support (rather than the other way around) is a much more powerful approach to project implementation. Training and implementation of B4SS in Kenya was directly related to farmer needs and priorities.

290. Ethiopia had a similar approach, and where farmers were given the freedom to lead experimentation, there was a stronger drive for championship.

Lesson 4: Diversity of countries in the context of this project was a powerful force for mutual learning and sharing

291. All project respondents highlighted that the diversity of countries, and the platform created to actually meet in person and share project experiences were of utmost importance to improve and strengthen individual and capacity of the partners taking their initiatives back to their own countries. As an example, the training opportunity in China for the project coordinator in Vietnam strengthened capacity but also provided a relationship that extended to collaboration (e.g. soil samples were sent to China to be tested). Another example, where Ethiopian colleagues were exposed, in Indonesia, to the Kon Tiki kilns, allowed for them to copy the technology through their engineering students building similar kilns in Ethiopia.

292. Testing biochar in different country contexts also allowed the project to identify which formulations and application rates are most appropriate where, and thus allowed the project to then be able to share results with wider audiences.

Lesson 5: Strong professional relationships lay a foundation for life-long commitments to achieving sustainability results

293. Many project respondents felt a very strong need to highlight life-long commitments and collaborations made in biochar and SLM through their professional relationships that were strengthened or forged through the project implementation.

294. It is something worth thinking about, the role of partnerships and professional (often also tied to personal bonding) relationships, and their role in the sustainability transformation.

C. Recommendations

295. As mentioned above, the project already produced a strong list (in the form of a matrix) for B4SS – specifically aligned to each target group. These are technical and practical and will not be repeated here (see Annex 9 for easy access to these). The following recommendations are in addition to these, and are intended to enhance sustainability for the spread of biochar and project continuity in general.

Recommendation 1. **Integration of biochar as an SLM innovation into relevant GEF/UNEP projects**

296. Because there are many projects in development with regard to LD and CC, both in GEF, but also other donor-funded UN Environment projects, it will be important to investigate and ensure how biochar application as a soil amendment in appropriate areas in the world can improve and strengthen projects and LDN-related success.

297. There are two practical ways to do this. The evaluator outlines these two separately, including the practicalities of who and how, in the table below.

Table 5. Two practical interventions for the further spread and uptake of biochar as an SLM intervention in future SLM-related projects

Recommendation 1	Why and what	Products and Methods of distribution	Who is responsible?
(a) Integration of biochar as a tested SLM innovation in coming new projects in the six B4SS countries	Building on the project interventions, foundation has been laid and the enabling factors are there, i.e. technical capacity, university and institutional links, international and national scientific researchers already connected into the countries, local government support through extension, etc).	Sharing of information materials and links to website, directly communicating with project leads in the six countries as projects come up	Project Task Manager and Sub-Programme Coordinator, (new) Project Leads With the support of the Programme Coherence Unit
(b) Opportunistic integration of biochar as an SLM innovation in relevant and appropriate projects in other countries/regions	For other relevant GEF and/or UN projects, this is going to be more opportunistic and not always in UNEP control vis. the take up and integration into other projects. However, UNEP has the platforms to share the tools and materials possible. Given this was a successful project, and is an exemplary case of best practice within the SLM nexus, the evaluator would highlight this as much as possible. This should be done through the wide dissemination of project results and lessons, with direct link to technical recommendations and guides.	i. Develop a short two-page concept that can be widely shared (experience and success of the project) ii. Conduct a webinar or open talk, invite key representatives (e.g. invite Sub-Programme Directors UNEP, GEF, UNDP Roster of Experts for Project Development, Regional Office Heads) iii. Write a piece for the UNEP Results Newsletter (under the leadership of the Deputy Executive Director)	Project Task Manager

Recommendation 2. **Support value chain development in countries where biochar will not be produced at farmer level**

298. In some countries, most notably Vietnam, biochar production at farm-level will remain very small-scale. Farmers maintained that if biochar was for sale and accessible (and at a price comparable to chemical fertilizer), they would buy it, but to make it was not worth the effort. The demand by farmers to buy biochar is there, but the supply is lacking. In China, compound fertilizer production is easier because they have a bigger top-down directive from government to incentivize the value chain of biochar into compound fertilizer production.

299. The evaluator is not convinced that a value chain will rapidly develop on its own in a country like Vietnam without some level of external support. Some businesses started up during the implementation of the project, but these have struggled to hold on. Some external support into strengthening a value chain for biochar production in Vietnam would go a long way to enhance uptake. **Who and what?** UNEP, Executing Agency, and Vietnam project partner to discuss possibilities and possible entry points. Country partner to further discussions at country level to identify funding opportunities. **When?** As soon as possible.

Recommendation 3. **Continue scientific integrity and sustainability into biochar production technologies, through continued student support and collaborations, and networks**

300. Biochar production is spreading globally. It will be important to maintain scientific integrity and the principles of sustainability (particularly as it is being sold as a "climate change mitigation" technology). There is a lot of business interest, and there is a fine line to be drawn where unintended outcomes might result in unsustainable or dirty production. The greater the network of scientists and sustainability practitioners who understand biochar production and its role, the more checks and balances there will be to continue on the right path.

301. Already, through the project, and post-project, a new generation of biochar scientists are developing. Continued support and university collaborations is an important factor to strengthen this network. ***Who?*** IBI would be a good platform (and the regional ones at regional level) to take on this responsibility of connection and collaboration, including checks and balances. ***When?*** Ongoing.

Recommendation 4. **Integrate TriPaDev methodology into relevant projects**

302. The TriPaDev methodology[80] is novel and highly useful in many projects that are implemented on the ground, particularly in resource management and SLM. The evaluator recommends that this methodology is integrated into future project development that aims to work with communities on grass-roots change, particularly in NRM and agriculture.

303. As already mentioned in the lessons, this methodology has the potential to vastly improve ownership and uptake of project results. ***Who?*** Project developers in UNEP. ***When?*** Ongoing.

Recommendation 5. **Integrate system dynamics modelling into future programmatic development for a greater understanding of sustainability leverage points in the system**

304. All projects inherently fall under the same systemic change process – one of radical transformation to a new global agenda for sustainability. However, projects often end up focused and working in isolation, and then are unable to change things outside of their control (e.g. economic growth resulting in social changes). For programmatic development at a higher level, and much beyond the scope of this project, or even the context of SLM, it is important to take a systems approach to change. There is too little time left and the global sustainability community needs to be as strategic as possible in identifying the right leverage points in the system to effect the change needed to get humanity onto a sustainable track and avoid collapse.[81]

305. A system dynamics modelling exercise for programmatic development will support informing which projects can leverage most change. This project may have been able to identify the social constraints and leveraged change better within the system had it had this background to work from.

306. This is a recommendation that goes beyond this project, and should be pitched at a higher level, most likely within the UN and GEF platforms. ***Who and what?*** UNEP Evaluation Office bring this recommendation to the attention of Sub-programme Coordinators, and the Policy and Programmes Division in the context of the Theory of Change process for the sub-programmes (and higher level) ***When?*** As soon as possible.

[80] https://biochar.international/guides/participatory-trials-design-partrides-methodology/

[81] A small article that shares the justification and importance of systems thinking and system dynamics modelling can be found here: http://www.progress-namibia.com/main/post/if-we-could-all-think-in-systems-we-could-build-a-better-world/

ANNEX I. RESPONSE TO STAKEHOLDER COMMENTS

To be completed in final report

Table 6: Response to stakeholder comments received but not (fully) accepted by the reviewers, where appropriate

Stakeholder comment	Response from evaluator
Xxx	Xxx

ANNEX II. EVALUATION ITINERARY AND STAKEHOLDER LIST

Table 7: Evaluation Itinerary of the country mission for the B4SS Terminal Evaluation (Ethiopia, China, Vietnam)

Ethiopia	
10 July Afternoon	Meeting Prof Berhanu Belay
11 July Morning	Visit to University Research Station, tour of centre, visit to demo site Visit to 5 farmer demo plots Ibrahim Aba Fita Abdul Kadir (*absent, only saw farm*) Shemsa Fita (*absent, saw farm, spoke to relative*) Abra Teman (*saw farm*) Kemo A Jebel
11 July Lunch	Lunch meeting Berhanu Belay
11 July Afternoon	Interview Milkiyas Ahmed
12 July Morning	Interview Berhanu Belay
12 July Lunch	Meeting group (Berhanu Belay, Milkiyas Ahmed, Bebe)
China	
15 July Afternoon	Meeting with NAU team: Dr Xiaoyu Liu, Prof Genxing Pan, Prof Lianqing Li, Dr Rongjun Bian
15 July Evening	Dinner Xiaoyu Liu
16 July Morning	Travel to Anhui Province
16 July Afternoon	Visit to field experiment site in Anhui Province (overnight)
17 July Morning	Biochar compound fertilizer factory Anhui Province
17 July Afternoon	Travel back to Nanjing
18 July Morning	Interview Genxing Pan
19 July Morning	Visit to biochar manufacturer Luhe Nanjing and IBI Asia Centre
19 July Afternoon	Lunch and visit to downtown two biochar students
Vietnam	
20 July Evening	Planning meeting with Mai Thi Lan Anh
21 July Day	Farmer Visits Ms Le Thu Luan (Farmer) Mr Duoby Xuan Vurg (Farmer) Ms Hoang Thi Cui (Leader of Women's Union of Deo Vai Hamlet) Mr Nguyen Van Lang (Farmer) Chuan Chu Commune, ChoiMoi
22 July Day	Local Government Meetings Mr Le Phuc Lau (Leader of Local Quang Chu Commune) Ms Ma Van Duyen (Vice Leader of Local Quang Chu Commune) Ms Thu Lhi Thy (Leader of Women's Union of Quan Chu Commune) Interview with Mai Thi Lan Anh
23 July Morning	Meeting Trainer of Biochar Application

Table 8. Stakeholders interviewed in addition to the country visits for the B4SS Terminal Evaluation

Stakeholder	**Role**	**Method of interview**
Gerard Cornelissen	Indonesia Project Coordinator, NGI	Skype interview
Neneng Nurida	Indonesia Project Partner, ISRI	Attempted skype, technical problems, sent questionnaire
Jubi Jubaedah	Indonesia Project Partner, ISRI	Attempted skype, technical problems, sent questionnaire
David Lelei	Kenya Project Coordinator, World Agroforestry Centre - ICRAF	Skype interview

Stakeholder	Role	Method of interview
Brenton Ladd	Peru Project Coordinator, APRODES	Skype interview
Lukas van Zwieten	Scientific Panel Member, NSW DPI	Skype interview
Annette Cowie	Chair of Scientific Panel, NSW DPI	Skype interview
Johannes Lehman	Scientific Panel Member, Cornell University	Skype interview
Stephen Joseph	Scientific Panel Member, University of NSW	Requested for skype on several occasions, respondent too busy
Adam Blakester	CEO, Starfish Initiatives	Skype interview
Ruy Anaya de la Rosa	Project Director, Starfish Initiatives	Skype interview and face-to-face meeting/debrief
Ersin Esen	Task Manager, Ecosystems Division, UN Environment	Skype meetings
Pooja Bhimjiani	FMO, UN Environment	Email interview

ANNEX III. PROJECT BUDGET AND EXPENDITURES

Table 9: Project Funding Sources Table

Funding source All figures as USD	Planned funding	Secured funding
Funds from the Global Environment Fund	1,826,484	
Sub-total: Co-financing Cash contributions		
UN Environment Extrabudgetary	350,000	400,000
Extra-budgetary funding for staff-posts (listed per donor)		
Starfish Initiatives	430,000	487,138
Cornell University	150,000	150,000
Nanjing Agricultural University	60,000	60,000
Norwegian Geotechnical Institute		20,000
NSW DPI	64,000	64,000
Sub-total: Co-financing In-kind contributions		
TNUS	98,000	
Jimma University	25,000	15,000
Nanjing Agricultural University		81,000
Norwegian Geotechnical Institute		80,000
APRODES	80,000	
NSW DPI		5,000
University of Udine	19,331	
World Agroforestry Centre - ICRAF		195,701
Sub-total: Co-financing contributions	**1,257,800**	**1,780,970**
Total	**3,084,284**	**3,607,454**

*Funding from a donor to a partner which is not received into UN Environment accounts, but is used by a UN Environment partner or collaborating centre to deliver the results in a UN Environment – approved project.

Table 10: Expenditure by Outcome/Output

Component/sub-component/output All figures as USD	Estimated cost at design	Actual Cost/ expenditure
Component 1 / Outcome 1	1,268,500	3,084,282
Component 2 / Outcome 2	1,375,284	
Project Support Costs	215,500	41,316 (only includes legal fees, sundry, annual financial audits)

*costs are not given per component but instead per budget line, so it was impossible to divide costs between components, this cost includes budget lines: project coordinator, role of biochar, knowledge management, project management, travel costs, in-country partner allocations, training, scientific panel meetings, office equipment, reporting and dissemination, communication

Table 11. Financial Management Table of the B4SS Project (GEF IF: 5824)

Financial management components:		**Rating**	**Evidence/ Comments**
1. Completeness of project financial information[82]:			
Provision of key documents to the evaluator (based on the responses to A-G below)		HS	
A.	Co-financing and Project Cost's tables at design (by budget lines)	Yes	Yes, well outlined at design, including separate excel budget
B.	Revisions to the budget	Yes	Yes, well communicated
C.	All relevant project legal agreements (e.g. SSFA, PCA, ICA)	Yes	n/a
D.	Proof of fund transfers	Yes	n/a
E.	Proof of co-financing (cash and in-kind)	Yes,	Generally, co-financing was well-documented, including additional co-financing secured (although more detailed costs not provided)
F.	A summary report on the project's expenditures during the life of the project (by budget lines, project components and/or annual level)	Yes, by budget line only	This was by budget line only, so was difficult to discern by component/output; however this was the level of reporting expected at this time of project implementation
G.	Copies of any completed audits and management responses *(where applicable)*	Yes	n/a
H.	Any other financial information that was required for this project (list): *legal letters of delayed funds disbursement between UNEP and Executing Agency*	Yes	n/a
Any gaps in terms of financial information that could be indicative of shortcomings in the project's compliance[83] with the UNEP or donor rules		No	n/a
Project Manager, Task Manager and Fund Management Officer responsiveness to financial requests during the evaluation process		HS	n/a
2. Communication between finance and project management staff		HS	
Project Manager and/or Task Manager's level of awareness of the project's financial status.		HS	Strong level of awareness of project financials by FMO and TM
Fund Management Officer's knowledge of project progress/status when disbursements are done.		HS	FMO highly aware of project progress and financial status

[82] See also document 'Criterion Rating Description' for reference

[83] Compliance with financial systems is not assessed specifically in the evaluation. Nevertheless, if the evaluation identifies gaps in the financial data, or raises other concerns of a compliance nature, a recommendation should be given to cover the topic in an upcoming audit, or similar financial oversight exercise.

Level of addressing and resolving financial management issues among Fund Management Officer and Project Manager/Task Manager.	S	Umoja system issue could have been better communicated from onset, otherwise good communication
Contact/communication between by Fund Management Officer, Project Manager/Task Manager during the preparation of financial and progress reports.	HS	Level of understanding and recollection, as well as reporting, as well as communication between FMO and TM strong.
Overall rating	HS	**Overall, exemplary project in terms of organisation and financial completeness**

ANNEX IV. LIST OF DOCUMENTS CONSULTED

Documents reviewed for the B4SS Terminal Evaluation include:

Evaluation Terms of Reference

GEF MSP B4SS Project Document

GEF Submission and Review Documentation, including UN Environment Response

Half yearly Progress Reports

Final Report

Inception Workshop Report Package

Mid-Term Workshop Report Package

End-Term Workshop Report Package

Website: Project outputs and products (including guidelines, posters, videos, etc)

Scientific Advisory Panel Reports

Event and Workshop Reporting

Starfish Project Director TOR

All financial reports (quarterlies, final, co-financing, budget expenditures)

Country reporting and baseline, technical reports

Agreements, amendments and formal correspondence letters

ANNEX V. EVALUATION BULLETIN

To be developed at final stage

ANNEX VI. BRIEF CV OF CONSULTANT

Name	Justine Braby
Nationality	Namibia (and Germany)
Languages	English, German, (learning Spanish)

Academic Qualifications
PhD Zoology, University of Cape Town, Cape Town, South Africa, June 2011
Postgraduate Diploma (International) Environmental Law, University of Cape Town, February 2007
Postgraduate Certificate Education (Senior Phase and Further Education), University of Cape Town, December 2005
Bachelor of Science (Zoology), University of Cape Town, December 2004
[Training certificate in the Economics of Ecosystems and Biodiversity, GIZ and Government of Namibia (2011)]

Summary of Professional Background
Professional expertise ranges from project development, implementation to evaluation of GEF and other donor-funded projects for agencies like UNDP, UN Environment, FAO and IUCN; communication strategy development, implementation and evaluation for various institutions; capacity-building interventions and facilitation of participatory processes; development of NAPAs, national development plans, strategies and action plans. Justine has thematic expertise and extensive experience in international environmental law (reporting and implementation), climate change (adaptation mostly), sustainable land management, biodiversity and ecosystem services, alternative development paradigms (alternative economics), coastal zone management, water resource management, and renewable energy as it pertains to climate change. She has worked for African governments and international and national development agencies all over Africa, and had experience working in several countries in Latin America, Europe, and Asia.

Regional Experience
Africa (West, East, South, Central), Latin America, Europe, Asia

Professional Associations
Appointee to the High Level Panel on the Economy advising the President of Namibia
Steering Committee Member of the Balaton Network on Sustainability (www.balatongroup.org)
Steering Committee Member of the Namibia Small Grants Programme
Advisory Panel Member of the NUST PAC Regional and Rural Development Honours Programme
BIOPAMA Regional Advisor
Member and Task Force Member of the Wellbeing Economy Africa Research Action Network (www.we-africa.org)
Core Team Member of the Research Group of the Wellbeing Economy Alliance (www.wellbeing-economy.org)
Founder of the Namibia Youth Coalition on Climate Change (www.youthclimate-namibia.org)
Climate Change Focal Point and Member of the IUCN Commission on Education and Communication (www.iucn.org/cec)
Roster of Experts of UNDP Biodiversity and Sustainable Land Management Portfolio

Publications experience
Wellbeing Economy, Climate Change Adaptation, Community Resilience, Communication, Education and Public Awareness, Zoology, Marine Biology, Ecology, Alternative Economics/Beyond GDP

ANNEX VII. EVALUATION TORS (WITHOUT ANNEXES)

Insert final version of ToR at final report

ANNEX VIII. QUALITY ASSESSMENT OF THE TERMINAL REVIEW REPORT

Evaluation office to coordinate at final report

ANNEX IX. RECOMMENDATIONS FROM BIOCHAR FINAL WORKSHOP AND REPORTING

Table 12. Recommendations listed per stakeholder and procedural area by project partners collected at the final workshop (Source: copied from Final Workshop Report)

	Scientists/students Bio-physical / technical aspects	**Farmers/ landholders Socio-economic aspects**	**Policy makers Policy and implementation**
Biomass source	Sustainably- and locally-sourced without causing environmental degradation and preferably using a biomass source that otherwise causes environmental harm (e.g. eutrophication, GHG emissions).	A biochar system should be likely to adopt when it replaces other costly (financial, time, environmental) inputs (e.g. nutrients, fuel, lime). A participatory approach should be effective in promoting biochar use for SLM.	Focus on biomass that leads to avoided environmental costs, such as human health and water pollution (e.g. manures). Biochar should be appropriate for biosecurity purposes.
Biochar production	Low emissions – GHG, particulates, CO (Kon Tiki kiln, engineered kilns). Must have dry biomass of appropriate size. Ideally, use the energy co-produced in a biochar system.	Biochar should be cost-effective, easy and safe to produce; biochar products should be safe and easy to handle.	Focus on technology development, distribution and commercialisation.
Biochar application to soil	Formulation: co-composting or combining with nutrients can enhance agronomic benefits and/or reduce fertiliser requirements. Biochar should be most effective when: 1) applied to soil with low pH, low CEC and coarse texture, 2) nutrient use efficiency is low (e.g. due to N leaching, P fixation), and/or 3) remediating soil health (heavy metals, PAH / organic contaminants).	More readily adopted where biochar integrates with existing practices. Ideally replace/enhance/ complement what farmer is already doing. Add biochar to high-value crops, add to reduce noxious side effects (odour of animal manure, etc.). Upscaling: work with landholders, champion farmers, extension agents, involve broad stakeholder groups and policy makers.	Focus on addressing a production constraint where locally there are no or few other options that may be too expensive or not accessible. Include biochar in resilience programmes. Biochar can be used to meet land degradation neutrality targets.