

## CONCEPT IDEA NOTE FOR CLIMATE RELATED ACTIVITIES THAT MAY BE FUNDABLE BY THE GREEN CLIMATE FUND AND OTHER FINANCIAL SOURCES

This Concept Idea Note is based upon the GCF Concept Note. It is designed to prepare any Concepts or Project Ideas with GCF financing in mind, however, can also be applicable to other financial institutions. Once the Concept Idea Note is completed please send to the CCCI office (as the GCF National Focal Point), where an assessment will be undertaken as to whether the Concept could be eligible for funding under the GCF or other financial source, or both. CCCI will then communicate the result of the assessment back to the proponent, and outline what will next happen to the Concept Idea Note, such as require more information to make a clearer assessment, the submitted Concept is GCF eligible for funding and the next steps, or a determination that outlines the Concept is not eligible for GCF funding but may get funding from another source.

**Title of Concept OR Project Idea:**

Biochar

**Date of Submission** 26 October 2018

**Submitted by and Contact** Teava Iro – please contact Teava Jnr 71427 or Ngairinga Kotrine 71778

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| <p><b>Indicate the areas for the Concept, which is based upon the CKI Country Program thematic areas</b></p> | <p><u>Mitigation:</u> Reduced emissions from:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Energy access and power generation</li> <li><input type="checkbox"/> Low emission transport</li> <li><input type="checkbox"/> Buildings, cities and industries and appliances</li> <li><input checked="" type="checkbox"/> Forestry and land use</li> </ul> <p><u>Adaptation:</u> Increased resilience of:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Most vulnerable people and communities</li> <li><input checked="" type="checkbox"/> Health and well-being, and food and water security</li> <li><input checked="" type="checkbox"/> Infrastructure and built environment</li> <li><input type="checkbox"/> Ecosystem and ecosystem services</li> </ul> |
| <p><b>Indicative total project cost</b></p>  | <p>Amount: NZD 5,000,000.00</p>   |

### **Project/Programme rationale, objectives and approach of programme/project (max 100 words)**

*Brief summary of the problem statement and climate rationale, objective and selected implementation approach, including the executing entity(ies) and other implementing partners.*

Biochar is a charcoal made from plant matter through a special process that locks the carbon into it and holds it in this form for hundreds (maybe thousands) of years. Once created, biochar has positive applications to improve water quality and soil fertility whilst still holding onto the carbon it has locked in.

This an opportunity to create a product that has applications in up to three different areas key to the resilience of our Country and contributing to mitigating climate change effects.

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### **Context and baseline (max. 2 pages)**

*Describe the climate vulnerabilities and impacts, GHG emissions profile, and mitigation and adaptation needs that the prospective intervention is envisaged to address.*

*Please indicate how the project fits in with the country's national priorities and its full ownership of the concept. Is the project/programme directly contributing to the country's INDC/NDC or national climate strategies or other plans such as NAMAs, NAPs or equivalent? If so, please describe which priorities identified in these documents the proposed project is aiming to address and/or improve.*

*Describe the main root causes and barriers (social, gender, fiscal, regulatory, technological, financial, ecological, institutional, etc.) that need to be addressed.*

*Where relevant, and particularly for private sector project/programme, please describe the key characteristics and dynamics of the sector or market in which the project/programme will operate.*

#### **The issue.**

Our lagoon has been the victim of pollution because of nutrient runoff from fertilizers and other chemicals used in agriculture, animal waste, grey water, and leaks from septic tanks. There is also the reality that wetlands and swamps, our natural nutrient filters are slowly being back filled for houses. As a country, our solutions have been focused primarily on education and awareness where agriculture and animal waste is concerned and a sanitation scheme in Muri and parts of Titikaveka around 3 years ago.

There have been small changes in our People and their attitude towards our lagoon and care of the environment overall, and this is encouraging. The nutrient levels of the lagoon however will take time to recover and there is no updated water quality report available from the Ministry of Marine Resources to boost confidence on this subject.

Biochar presents an opportunity to filter out nutrients leaking through our water and septic systems and compensate for the lack of natural filters. The positive effects can be complemented with the continued education and awareness of our people as to what chemicals they involve in their lifestyle choices.

#### **Background.**

To create Biochar, plant matter or biomass is pyrolyzed. Wikipedia sums up the process neatly with its definition of pyrolysis as "a thermochemical decomposition of organic material at elevated temperatures in the absence of oxygen (or any halogen). It involves the simultaneous change of chemical composition and physical phase, and is irreversible."

A natural result of this "charring of organic matter" is that it becomes a natural sequester to carbon; locking this into its porous structure permanently. Carbon dioxide is arguably the top anthropogenic GHG flooding the atmosphere. Biochar gives us a solution to counter this activity and it has been suggested that it may even have carbon negative effects, although further research may need to be done, if not already (and yet to be read by the implementer) by the scientists and experts.

Biochar has been used primarily in an agricultural setting as a soil amendment. It has the ability in its structure to retain water and water-soluble nutrients, and provide a home for the microorganisms that boost soil health. The consequences are much healthier plants, better nutrient availability, less irrigation and fertilizing. These are the known benefits of biochar in agriculture if certain biomasses are used, a certain speed of pyrolysis is followed and depending on what other additives or inputs to the agricultural field have been.

There has been little research put into the applications of biochar in water and wastewater treatment until the perhaps the last 5 years. However, charcoal filters have been on the market for years and this is essentially, that same principle. Researchers and PHD students from Massey University in New Zealand, Jawaharlal Nehru University in India, Korea University and Mississippi State University in the U.S.A to name a few, have all reached the same positive conclusion in regards to biochar's effect on water and wastewater. They have found evidence that biochar can remove contaminants (organic and inorganic) from water.

There are still so many articles and research papers yet to be combed through, with possible biochar applications in other areas and its fair share of opposition. It is strikingly obvious however, that there are positive applications for the Cook Islands now.

#### **Design.**

The design of the actual oven currently being used on Rarotonga to make biochar is simple. It is a cleaned out old diesel drum under another slightly bigger drum with a chimney. This is a mobile design which makes it easier to create the biochar as it can be taken to the biomass source. This can be viewed in action at the Down to Earth yard in Papaaroa, Titikaveka.

A few more mobile ovens and 2 or so bigger more permanent ovens will be needed to get the most out of the biochar applications. Using biochar as a waterway and septic filter requires the finished product to be piled into steel cages and gabions and to be weighted down into the water.

The saturation limit of biochar can vary, but once this limit is reached, the biochar will no longer be effective and will need to be replaced. In the septic systems, nutrient levels can be tested by Public Health to ensure effectiveness. In the waterways, we have no immediate suggestion for testing the saturation limit as its insertion will not be a wall but rather like a maze with channels that allow the creatures of the waterway to move freely.

Saturated biochar from septic systems cannot be used in food gardens but will be beneficial to flower gardens and forestry. Saturated biochar from waterways can be applied to food gardens.

How long exactly it takes for biochar to reach its saturation limit still needs research as there are too many variables to have one conclusive answer. However, production of replacement biochar will be much quicker and a simple process.

#### **Obstacles.**

The biggest obstacle to this project is financial. The ovens will need to be forged from sheet metal and the gabions and weighting custom built to fit the different waterways and septic filter areas it will be inserted into.

Political interference and regulatory obstacles may not be an issue as we've already had positive interactions with the Public Health, Cook Islands Tourism Corporation and The National Environment Service thus far.

#### **Implementation.**

The writer of this submission will also act as the implementer as he is actively manufacturing the product and has the capability to ensure the right relationships are formed for this to be effective. The target is to filter a thousand septic systems and as many waterways as possible on Rarotonga. There is potential to expand to more homes and waterways on Rarotonga, and the Outer Islands once the original target is met.

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**Engagement among the NDA, AE, and/or other relevant stakeholders in the country (max ½ page)**

*Please describe how engagement among the NDA, AE and/or other relevant stakeholders in the country has taken place and what further engagement will be undertaken as the concept is developed into a funding proposal.*

Public Health have already approved the use of this filter at the septic system of the public toilets on Papaaroa beach that have been closed for some time now due to a septic system failure. This will become a working example in the coming months.

Cook Islands Tourism Corporation has been open to the idea also as they come from the angle of having working public toilets for our visitors. This is also an opportunity to share with our visitors our Country's commitment to caring for our environment.

The National Environment Service have been aware of the local research into biochar and its applications in our waterways. They have brought visiting and local schools and children to the Down to Earth yard to learn about the possible application of biochar in addition to other initiatives at the yard. The Ministry of Agriculture has also taken interest in the initiatives from this yard.

The biggest engagement will be the community. For the biochar properties to be taken advantage of, we need the community to accept the filters into their septic systems and our waterways.

Local research has concluded that there is enough organic matter available to produce biochar. A particularly fast-growing tree, the Albizia, can be harvested sustainably to avoid the huge rush to produce this biochar whilst contributing to the global decline in oxygen levels.

The materials for the forging of the ovens, gabions and weights can be sourced and made locally.

For the duration of the project, progress updates must be made to both the Government Agencies, the community and importantly the fund that allows this project to be a reality.

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**Sustainability and replicability of the project (exit strategy) (max. 1 page)**

*Please explain how the project/programme sustainability will be ensured in the long run and how this will be monitored, after the project/programme is implemented with support from the GCF and other sources.*

*For non-grant instruments, explain how the capital invested will be repaid and over what duration of time.*

This project is a simple one to replicate, and only requires dedicated people to make it happen. Ongoing sustainability is almost guaranteed as the initial setup stages is the costliest.

We expect that eventually it will become a norm and be written into standards and policies. Here it becomes simple to convert into a user pay's system as the People will then need to have it and more so, understand its properties and positive applications and demand the product.

**Assessed By and Date:**

**Recommendation:**