
INGSA WORKSHOP MATERIALS

CARBONERIA:

Competing technology-based economic proposals with multiple stakeholders

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A PIECE OF BIO-CHAR



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CARBONERIA:

Competing technology-based economic proposals with multiple stakeholders

Note: materials in this case are fictional and should not be taken to represent real-life people, places or events.

Carboneria is a country in Sub-Saharan Africa with a democratic federal system of government which has managed three largely peaceful changes in government since independence although prior to that there had been one military coup. It is an emerging economy, though it is largely still agriculturally dominated, with a per capita GDP of \$1720 (USD) in the last year. The major source of external income is eco-tourism especially to the forested north of the country and exports from plantations in the west of the country. There is also a small amount of natural gas production but it is largely used domestically. One European agri-food company operates 4 cocoa and coffee plantation sites in western Carboneria, but the majority of agriculture in that region is subsistence and small-scale market farming. The population is urbanising, however, with internal migration to the regional centres and the federal capital city rising rapidly. The urban population in particular has undergone considerable nutritional transition with 25% now considered obese by the WHO definition, and women affected disproportionately. Currently, for reasons outlined below, the federal government is considering the promotion of bio-char use for carbon sequestration in its overall approach to enhance agricultural productivity and to highlight its commitment to climate change.

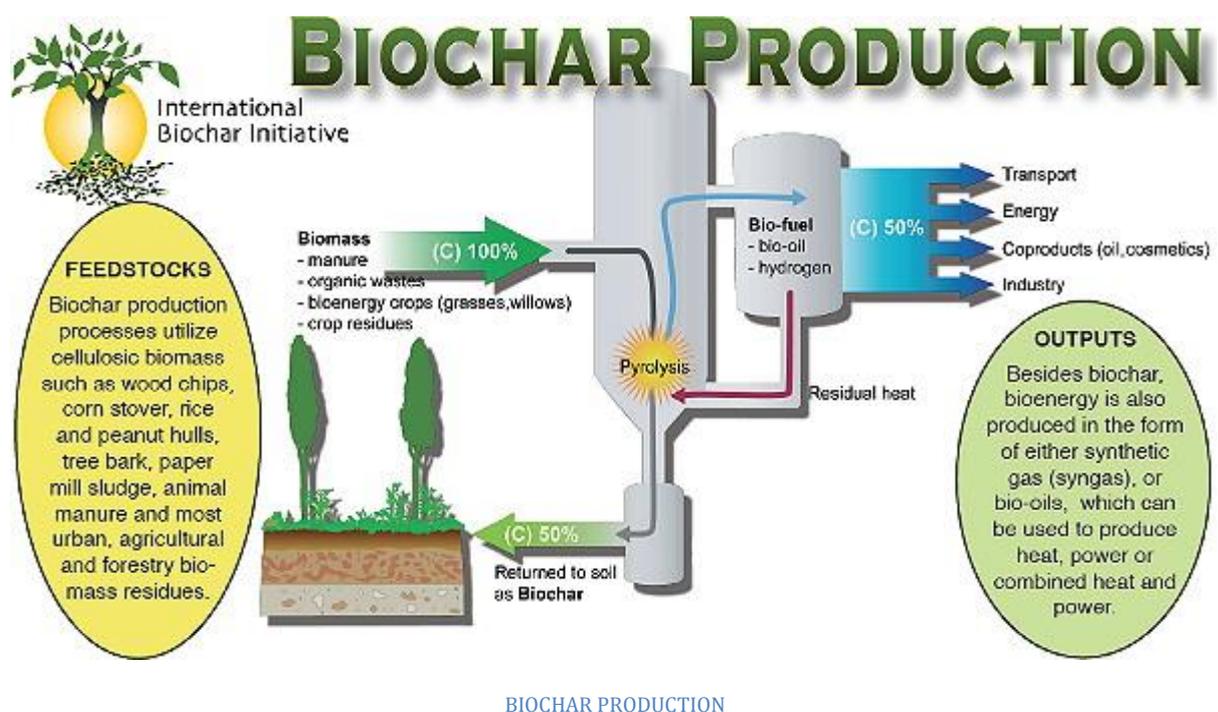
Background and context

Carboneria has invested in education as a key part of its national development strategy with an established national university including five smaller regional universities in each of the state capitals. It also has established a National Science Academy and there are three medical schools including one with a reputation for nutrition research.

Many of the country's most respected academics have had overseas experience and have returned to Carboneria. They are mainly agricultural and environmental scientists. Their influence and the reputation of the Prime Minister internationally have strengthened the country's reputation as a global leader among developing countries seeking to address climate change. Carboneria took a lead policy-based position at COP21 in Paris amongst peer countries in its announced Intended Nationally Determined Contributions (INDCs) to climate change mitigation. In particular, Carboneria has introduced what is seen as novel regulation of its public transport fleet and incentive schemes for motorists and taxi drivers to maintain and/or convert to high efficiency engines in their vehicles. The government of Carboneria is also looking at policy options to support the scale up of sustainable farming techniques such as better fencing of grazing land, soil remediation and wetlands protection and better forest management practices. Overall, these policies have been hailed by urban voters, but rural communities and especially farmers have experienced some difficulty in complying.

The dilemma

The carbon rich product known as 'bio-char' is produced by burning organic matter (e.g. farming or forestry by-product biomass) at a high temperature in an oxygen controlled environment in a process that also produces pyrolysis (gasification). Indeed, it is similar to the process of making charcoal, which is then tilled into the soil. This technique has been used for generations by indigenous peoples in many regions of the world to enhance the agricultural productivity of soil. However, there is no credible research on the details of this practice (e.g. how long it may have taken to produce demonstrable enhanced soil properties or whether composted biomass was also added to achieve the desired effect. The impact of relative humidity in areas where this practice occurred is also an understudied factor).



Since the early 2000s some scientists have suggested that, in addition to soil enrichment properties, the practice of burying bio-char can also be used as a key tool in climate change mitigation because it locks up (sequesters) carbon in soils. Consequently, there has been growing interest in using bio-char in large scale carbon sequestration projects, particularly as the global market for carbon offsets grows. The government sees this as a potential income earner.

Producing bio-char at the scale required to be meaningful in terms of greenhouse gas commitments or economic return on investment will require significant land use to create enough biomass available for pyrolysis. Much of the biomass will be obtained through the by-products of large scale farming operations and forestry, but increasingly there is global interest in creating new plantations of fast-growing vegetation specifically for bio-char generation. The plantation solution is supported by a growing number of investors internationally who see enormous potential of bio-char in the carbon

offsets market, though it has yet to be internationally recognised through the UN Framework on Climate Change.

Contrary to investor optimism, a major Australian-based publicly-funded research initiative is very cautious about the potential for bio-char as a bio-engineering solution. There are at least 25 field trials of bio-char currently underway throughout Africa. Early results have led the scientists to acknowledge some beneficial properties of bio-char in soil enhancement, but state that considerably more needs to be known about the interactions between bio-char and local soils in various conditions and with various types of bio-mass, as well as its carbon draw-down and sequestration capacities in various conditions. There are no longitudinal data and the issues of scale still need to be addressed as well.

Nonetheless, a group of international investors remains very encouraged by the results and want to get an early foothold in the bio-char carbon farming market. They have identified potential land for bio-char farming in the Carbonerian State of East Savaneria, which is in the rocky part of Carboneria that is largely viewed as economically unproductive because there are no commercial scale land-use operations. They deem this ideal for establishing a bio-char plantation and industrial scale production facility. Although the sites have no commercial farming operation, there is considerable subsistence crop farming by village cooperatives as well as some cattle and goat herding.

The investors have had preliminary talks with federal and state government officials. There has been some discussion about the impact on current land-users but there is a broad recognition that no individuals hold formal title to the land they have been husbanding for generations.

The role of scientific advice

The government and local leaders alike have also been approached by a number of strong NGOs, backed by several environmental groups internationally. But, these groups come with opposing views: About half of them want to discuss what they call the 'misconceptions surrounding bio-char production', warning that it is an unproven technology that will result in widespread displacement of local food crops and accelerated land-grabbing for low-grade biomass production because crop residues could never produce enough biomass to support a viable bio-char industry. They add that the soil enrichment properties of crop residue will also be lost if they are used for bio-char production. They raise the spectre of the bio-fuels controversy of the early 2000s, citing its *contribution* to global emissions rather than reduction. Yet other environmental groups fall on the other side of the issue; they are encouraging government officials and village leaders to take up bio-char processing as a viable economic development activity with beneficial environmental impacts despite the still uncertain potential of the market globally.

The foreign investment potential of the bio-char proposal for the same region is indeed highly attractive. A number of influential federal political leaders believe bio-char production would position the country as a leader in the growing climate mitigation market through carbon sequestration and credits trading. The proposed deal would require the state and national governments to jointly agree to lease the land to foreign developers as well as commit resources to site maintenance and infrastructure for an initial 20 year period with two 20 year rights of renewal. In return, the investors agree to a 65:25:15 split of the profits between the company, state and federal governments and to

funding a local high school and agricultural technical institute in nearby villages once the company is profitable.

But the local village leaders see an alternative. They are being encouraged by a former nutritional scientist, turned entrepreneur, living in the capital to commercially cultivate a local shrub called flavonella as it has been found that a natural non-sugar sweetener can be extracted and commercially produced from this plant. Flavonella is endemic to East Savaneria. The sweetener, while not yet licensed by any food safety agency is being developed for likely use in diet drinks by a multi-national food company (Global Health Food and Beverage Corporation GHFBC), which also has a senior scientist who is an expatriate from Carboneria working in their research headquarters. GHFBC thinks that it will be another five years before regulatory approval is achieved in a major global market for flavonella sweetener, but on the basis of their own internal data, it is well accepted as a replacement for sugar. The company is prepared to fund schools in the 5 villages at the centre of the proposed flavonella plantations in return for an exclusive option to purchase flavonella leaves in the event a food regulatory licence is granted for a major market in the next 7 years. An agreement has been drafted for the purchase price of flavonella leaves at that time. This agreement would guarantee significant income for the villages and the State, which is one of Carboneria's poorest.

With rumours about the new bio-char development increasing, traditional land-users have protested when potential investors visit the site and agitation is growing. There is considerable competing pressure by some local leaders and the multinational food company to start cultivating flavonella at scale.

Federal government officials are seeking advice on the merits of bio-char (including its potential to be accredited within the global Carbon Credits market) and the amount of land required for a sustainable bio-char economy to develop. But village leaders and many within the State government are not convinced about bio-char and much prefer the idea of growing flavonella, as they believe this would allow many of the state population's traditional land-use practices to continue. Thus, they want to compare the bio-char option to the continued use of the land by subsistence farmers with sustainably developing the area to cultivate flavonella. Yet for both options, the community benefit is dependent on the external market conditions materialising.

Both Federal and State governments are concerned about creating civic unrest after more than 20 years of stability. The Federal government needs to resolve the conflicting possibilities for land-use. The Science Advisor is asked to report on the relative merits of the bio-char and flavonella development as well as their impacts on current land-use practices and the local environment.

GROUP EXERCISES

Exercise 1: Group discussion

What issues does a science advisor or advisory system need to think about in preparing a response?

- Communication of complex science
 - Who are all the stake-holders?
 - How to get to the various groups?
 - How to handle media and other channels of communication?

- How secure is the evidence?
 - Is a study needed? Who should undertake it? How would it be set up?
 - Is there a difference between government-led science and science undertaken by the academy and that provided by companies?
 - What are the elements of knowledge brokerage in each case?
 - What we know
 - What we do not know
 - Risks of action or inaction in either case
 - Alternate approaches

- On what basis to compare the economic options?
 - How far should the Science Advisory role extend in this regard?
 - To what extent can the Science Advisory role comment on the export market?
 - Should the Science Advisor be involved in building the scientific case for carbon accreditation?

- Issue of social license
 - Is the science stronger or more uncertain for one option or the other? What considerations are there about the extent of uncertainty?
 - Do urban (majority of voters) and rural (majority of land-use stakeholders) voices align on the various options? What impact might that have?
 - How should the various protest and lobby groups be taken into account or not?

- Other considerations?

Exercise 2: Role-playing

Listed in no particular order, the following perspectives (participants may identify others) have been outlined for use in a role playing exercise. Participants are divided into groups and encouraged to both consider the perspective of various actors as listed, but also what the science advisor or advisory body might do in each situation.

Perspective 1: Science Advisor or Advisory Mechanism

- What perspectives and considerations should be reflected in any advice given?
- What is the role of the science advisor / advisory mechanism in this situation?

Perspective 2: Media

- A provocative reporter for a major television channel based in the capital city has recently interviewed NGO scientists about bio-char and found the information quite conflicting. The reporter wishes to interview the science advisor on bio-char to add clarity to the debate.
- How can the opportunity be optimised for science communication?

Perspective 3: Civil Society organisations (anti bio-char)

- You represent VillageAction, a local NGO that is seriously concerned about the dangers of bio-char production. You don't believe there is merit in raising crops in order to burn and bury them and you worry that moving too quickly on this question only lead to food insecurity and thus more environmental degradation. Your organisation has engaged sympathetic scientists to review the available evidence and 'advise on the advice'. What would you consider a fair and robust public discussion? What information do you require? How are you incorporating science into your thinking?
- How might the science advisor engage with this organisation?

Perspective 4: Civil Society organisations (pro bio-char)

- You represent Greenways, a local chapter of an international environmental NGO that has been a leading voice in promoting bio-char as a viable geo-engineering solution. Internationally, your parent group has funded scientists studying bio-char production and characteristics and is working hard on communicating the results of this work. You want to make sure that this evidence is considered by government and local leaders.
- How might the science advisor engage with this organisation?

Perspective 5: Business lobby (Bio-char)

- You represent the Carboneria Business Council that is working in partnership with a group of international investors to acquire land and licensing for a bio-char production facility in Carboneria. Your group has provided research funding to external scientists and economists to model the potential benefit of bio-char from both a scientific and economic perspective. You are aware of a number of other research projects in Africa, as well as ongoing work funded by the Australian government, and are considering linking with these groups depending on their outcomes. Your organisation has engaged sympathetic scientists to review the available evidence and 'advise on the advice'. What would you consider a fair and robust public discussion? What information do you require? How are you incorporating science into your thinking?
- What would the science advisor consider a fair and robust discussion in this regard? How could this be achieved?

Perspective 6: Business lobby (Flavonella)

- You are an economic development officer from the East Savaneria state government, which is currently in advanced discussions with an international food company to develop the natural sweetener derived from the flavonella shrub. You are aware of competing commercial

interests in the area but have a lot of local support for the Flavonella initiative from residents in your rural state. They are deeply mistrustful of the bio-char lobby as well federal government in general. You wish to engage federal government authorities with the evidence that the company has amassed on the market potential of flavonella, its regulatory status and the likelihood it can be scaled up as a cultivar.

- How can the science advisor integrate these strands of input?

Perspective 7: Politicians (Federal)

- As President you have received the advice and followed the media reports (and social media) on the issue. How are you incorporating science into your thinking? How does science advice figure among the various considerations in your decision-making
- How should the science advisor best deliver advice to the President of Carboneria?

Perspective 8: Politicians (State of East Savaneria)

- As State Governor of East Savaneria, you recognise the need for economic development opportunities for your constituency. At the same time, your electorate is counting on you to protect their way of life. How are you incorporating science into your think? How does science advice figure among the various considerations in your decision-making and your negotiations with your Federal level interlocutors?
- What should the science advisor consider when operating across jurisdictions?

Perspective 9: traditional rural land-users of Eastern Savannah

- You are a young professional hailing from Eastern Savannah, but based in the capital city. You have been requested by the traditional territorial chiefs to act as their spokesperson in land planning debates both with government and various industry stakeholders. What steps would you take to acquire and share relevant evidence? How might this inform your approach?
- What role does the science advisor play in engaging local stakeholders? How should this be managed?

Other perspectives may also be raised.

PHOTO CREDITS

COVER: A piece of bio-char. Credit: K.salo.85 - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=29973096>

PAGE 3: Biochar production diagramme. Credit: Johannes Lehman via International Biochar Initiative, <http://www.biochar-international.org/technology>, CC BY-ND 3.0, <http://www.biochar-international.org/terms-of-use>. Use of image does not imply endorsement by IBI.



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INGSA provides a forum for policy makers, practitioners, academics, and academics to share experience, build capacity and develop theoretical and practical approaches to the use of scientific evidence in informing policy at all levels of government.

INGSA's primary focus is on the place of science in public policy formation, rather than advice on the structure and governance of public science and innovation systems. It operates through:

- Exchanging lessons, evidence and new concepts through conferences, workshops and a website;
- Collaborating with other organisations where there are common or overlapping interests;
- Assisting the development of advisory systems through capacity-building workshops;
- Producing articles and discussion papers based on comparative research into the science and art of scientific advice.

Anyone with an interest in sharing professional experience, building capacity and developing theoretical and practical approaches to government science advice is welcome to join INGSA.

By signing up to the INGSA Network you will receive updates about our news and events and learn of opportunities to get involved in collaborative projects.

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