

INGSA CASE STUDIES

CARBONERIA:

Bio-char production, carbon sequestration, local farmers and multinational investors



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Background and context

Carboneria is a rapidly advancing middle-income country in which the agricultural sector plays the leading role. Its population is experiencing nutritional transition with as much as 25% the population (30% of women) considered obese by the WHO definition. Carboneria is also a global leader to address climate change. Currently, it is considering the promotion of bio-char in its overall approach to climate change.

Burning organic matter (e.g. farming or forestry waste material) at a high temperature in an oxygen controlled environment has long been known to produce pyrolysis (gasification) and the carbon-rich product known as 'bio-char'. Bio-char has been traditionally used by indigenous peoples in many regions to enhance the agricultural productivity of soil. More recently, some scientists have suggested that the practice of burying bio-char can be scaled up and 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.

Producing bio-char at the scale required for this kind of geo-engineering to reduce the effects of climate change 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 production. The plantation solution is supported by a growing number of investors internationally; they see enormous potential of bio-char in the carbon offsets market.

The dilemma

A group of international investors have identified land in the sparsely populated southern steppe region of Carboneria that is largely viewed as economically unproductive. 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 farming by village cooperatives. The region is also home to traditional hunting grounds. Most of the population outside the few urban centres of the region belongs to indigenous tribes.

At the same time, the local village leaders are also being encouraged by separate developers to commercially cultivate the local shrub, flavonella, from which a natural non-sugar sweetener can be extracted. This shrub is endemic to the region. The sweetener, while not yet licensed by any food safety agency, is being developed by a multi-national food company for use in diet drinks and sweets. The company thinks there will be another five years before regulatory approval is achieved in a major market, but on taste testing it is well accepted as a replacement for sugar. The company is prepared to fund a school in return for an exclusive option to purchase flavonella leaves in the

event a food regulatory licence is granted for a major market within seven years. An agreement has been drafted for the purchase price of flavonella leaves at that time which would guarantee significant income for the villages and the State.

Yet the foreign investment potential of the bio-char proposal for the same region is also highly attractive and political leaders believe it would position the country as a leader in the growing climate mitigation market. The proposed deal would require the state and national governments to jointly agree to lease the land to foreign developers as well to commit resources to site maintenance and infrastructure for an initial 20 year period with two 20-year rights of renewal. In return, the investors must agree to a 65:25:15 split of the profits between the company, local villages and the government and to funding a local high school and agricultural technical institute in nearby villages. The villagers, however, are pinning their hopes on growing flavonella, because they believe this would allow many of their traditional practices to continue. There is a history of bad governance and neglect of the region and of its indigenous population by central government in the capital located thousands of kilometres away.

Government officials are seeking advice on the relative merits of bio-char and the amount of land required for a sustainable bio-char economy to develop relative to its current use by subsistence farmers versus sustainably developing the area to cultivate flavonella at scale.

However rumours about the new bio-char development are increasing among the traditional land-users, who have protested when potential investors visit the site. At the same time, villages nearby are being strongly encouraged by one international NGO with a local presence to take up bio-char processing as a viable economic development activity, despite the still uncertain potential of the market globally. There is competing pressure by some local leaders and the multinational food company to start cultivating flavonella at scale, even though there is only a commitment for forward purchase if the external market conditions materialise.

The government needs to resolve the conflicting possible uses of the land. The science advisor is asked for advice 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.

Notes for mentors (not for distribution)

Consider the scenario from the perspective of various stakeholders:

- Traditional knowledge holders (and indigenous tribal leaders) and land users
- Village leaders
- National government
- Local government
- International environmental advocates
- Scientists
- Investors (bio-char / food company)

Some considerations might include:

- Sticking to the science, not getting into values debates
- What are the trade-offs of producing bio-char? How will it impact on local land use? Is commercial-scale production the only consideration?
- What are the trade-offs of cultivating flavonella at scale?
- What are the ecosystem impacts of both types of production?
- What is known and not known about geoengineering techniques? Does bio-char live up to its promise?
- What is the likelihood of the flavonella sweetener being licensed, what is its value proposition?
- Consider the ethics of crop displacement (food for fuel / subsistence practices for large scale) if bio-char is taken up more broadly
- What are the consequences of building large production facilities? Long term maintenance costs? Path dependency?
- How should local communities be engaged (considering different opinions on bio-char, flavonella and current land-use practices)
- How should local and international NGOs and companies be engaged? Are they promoting rumours or unproven ideas?
- Problems of scale: how do we know bio-char production and use for geo-engineering will really work at scale? How do we know flavonella cultivation will work? Can we gamble livelihoods and investment on it?

Group exercise module

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 (time permitting)

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 Asia, 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 southern steppe region of Carboneria 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 you 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 (southern steppe region of Carboneria)

- As State Governor of Southern Carboneria, 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 southern steppe region of Carboneria

- You are a young professional hailing from Southern Carboneria, 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 raised by workshop participants...



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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.

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