

Contents

Safeguarding biodiversity
in Ethiopia's coffee
forests: Opportunities
and challenges related to
intellectual property rights 1

Progress or setback? An
African regional instrument
to protect traditional
knowledge and folklore 4

Debating biotechnology 7

Biofuels and sustainability:
Is certification the answer? 9

Sticky sticker situation:
Food miles, carbon
labelling and
development 11

Raising agricultural
productivity in Africa:
The energy challenge 13

Sink or swim: Eco-patent
commons and the transfer
of environmentally
sustainable technologies 16

From export processing
zones to low carbon
development zones 18

Upcoming events &
resources 20

Safeguarding biodiversity in Ethiopia's coffee forests: Opportunities and challenges related to intellectual property rights

By María Julia Oliva

Not only is coffee production in Ethiopia significant in economic, social and environmental terms for the country itself – it also has critical implications for the genetic diversity of one of the world's most important commodities.

As attempts to protect and promote Ethiopian coffee develop, it is important to consider how these efforts can and should be structured to recognise and enhance the links to the protection of biodiversity and related traditional knowledge. This article provides a brief overview of the experiences in using intellectual property (IP) tools, such as trademarks and geographical indications (GIs), to maximise the sustainable development benefits of Ethiopian fine coffees. It focuses particularly on the opportunities and challenges for the conservation and sustainable use of biodiversity.

Ethiopian coffee: Economic, social and environmental considerations

Ethiopia is considered the birthplace of coffee. *Coffea arabica*, the aromatic and mild species of coffee used to produce the highest quality - and priciest - blends originated in the highland rainforests of south-western Ethiopia. The country still retains a critical role as the genetic base

of arabica coffee. Given the potential contribution to new varieties with increased yields, of higher quality and/or with disease resistance, its genetic diversity has considerable value, not just from an environmental perspective but from an economic one as well.¹

For Ethiopia itself, coffee has enormous economic, social and environmental significance. Coffee is an emblematic product for the country, making up around half of its exports. It represents an important part of Ethiopia's foreign exchange earnings, tax income and gross domestic product.² Coffee also directly supports the livelihoods of more than 25 percent of the population, and is at the centre of social and family life.³ Environmentally, the situation in Ethiopia is also unique, as coffee is still produced mainly in its natural habitat: 33 percent of Ethiopia's coffee comes from forest or semi-forest areas in which local biodiversity, as well as traditional practices, are generally maintained.⁴



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Despite its distinctiveness and reputation for excellence, Ethiopian coffee has been – as most coffees worldwide – traditionally sold as a commodity. In the past, sharp declines in the world price have thus reduced Ethiopia's national income and severely affected its coffee farmers that are increasingly using the land for other monoculture crops. Due primarily to these changes in land use, at one point it was estimated that Ethiopian highland forests would disappear by 2015.⁵

The fact that commodity prices currently are on the rise may solve some of the economic and social concerns. However, higher prices do not necessarily provide incentives for the conservation of coffee forests and traditional practices. As long as Ethiopian coffee is undifferentiated in the market, higher incomes will do little to help counter the trend to maximise profits by manipulating coffee forests into quasi-industrial plantations with monospecific production, and introduced varieties and know-how.⁶

The demand for and potential of specialty coffee – certain coffees distinguished and prized for their quality and social or environmental characteristics – appears to be very significant in the global market place. This fact has increased interest in potential strategies to differentiate Ethiopian coffee in the global market. A number of terms used by the coffee trade on the basis of the districts where the coffee is grown, such as Harar, Sidamo, and Yirgacheffe, have become known to consumers over the past years for their unique flavour profiles. According to the Ethiopian Coffee Network, the reputation of these coffees is "the result of the hard work of generations of Ethiopian coffee farmers" and should be protected. IP protection, as explained below, could provide various valuable tools towards this end.

Potential and limits of trademarks and geographical indications

Distinctive signs, such as trademarks and GIs, identify products or services in relation to their origin, quality or other characteristics. By using these signs to protect the names of its coffees, Ethiopia would avoid unauthorised use by other producers, roasters or retailers. Distinctive signs would thus preserve the reputation and potentially enhance the market share of Ethiopian coffee. Trademarks or GIs would also allow the country to capture the potential premium price derived from the increased valuation of its coffee. Finally, insofar as they incorporate the link between Ethiopian coffee and the protection of biodiversity, these distinctive signs could play an important role in safeguarding the country's coffee forests and related traditional knowledge.

Both trademarks and GIs would be able to perform these functions. Each distinctive sign has unique features, however. It is therefore worth considering the opportunities and challenges presented by the different tools and strategies in maximising sustainable development benefits derived from Ethiopian coffee. A number of ongoing initiatives in relation to the use of distinctive signs for Ethiopian coffee already provide valuable lessons in this regard.



Trademarks and certification marks

Trademarks distinguish the products of one enterprise from others. A certification mark is a particular type of trademark that – though owned by a particular enterprise or association – may be used by anybody who complies with certain standards. Certification marks are widely used to protect various labelling and certification schemes, including in relation to some types of coffee. Existing certification systems, such as Fair Trade or Bird Friendly standards, have been considered by some actors in Ethiopia as ways to promote compliance with important social and environmental principles. However, there has been some concern that they would not necessarily fulfil the goal of harnessing the reputation of Ethiopian coffee.

Surendra Kotecha, former Chief Advisor to the EU Coffee Improvement Programme in Ethiopia, has pioneered the notion of developing a new label for "Forest Arabica Coffee."⁷ The label would be developed and implemented through a partnership of government, donors, coffee farmers, and private sector investors, and in cooperation with, for example, the Forest Stewardship Council or the Rainforest Alliance. By protecting the inherent link between Ethiopian coffee and highland forests, such a label would bring not only biodiversity benefits, but it would also dramatically increase the quality of Ethiopian coffee since compliance with the established guidelines would lead to improvements in growing and post-harvest practices.

When the Ethiopian government began considering IP protection for the names of its finest coffees, it did contemplate the use of certification marks. However, it deemed that certification marks would not provide the "more equitable leverage" it was pursuing with trading and retail companies. Indeed, as initial efforts to gain IP protection were closely linked to the unauthorised use of names by the global coffee giant Starbucks, the primary objective of the Ethiopian government seems to have been to gain control over the references to its coffees. As a result, Ethiopia's efforts have focused on obtaining conventional, rather than certification, marks.

Consequently, questions have been raised over whether the initiative can achieve its objectives to provide benefits to all actors in the coffee trading chain, particularly farmers. The Ethiopian coffee initiative's website explains, for example, that benefits will reach farmers as their incomes increase along with export revenues for Ethiopian coffee. Nevertheless, such equitable benefit-sharing cannot be assumed without proper requirements or guidelines. The lack of guidelines is equally problematic in relation to biodiversity and other sustainability criteria. There are also concerns that, with no clear, general and objective rules guiding the use of the trademark, the owner – in this case the Ethiopian government – would be able to exclude or discriminate between growers from the same region, for example. All these shortcomings could entail negative social and environmental effects.

Geographical indications

Another alternative would be to seek protection for the names of Ethiopia's gourmet coffees as GIs. GIs generally identify a product as originating in a place and as having a series of particular characteristics derived from that place. Ethiopian coffee beans are identified and distinguished by their geographic origin. Sidamo coffee comes from various growing districts in Sidama, an area in southern Ethiopia. Coffee from Yirgacheffe, a small sub-region of Sidama, is considered exceptional due to the particular microclimate. In this regard, experts note that the cup quality of Ethiopian coffee derives not only from the genetic make-up of its beans, but also from local factors such as climate, soil type, shade conditions and traditional practices.

There is a clear trend towards distinguishing fine coffees by their specific origin in Ethiopia, or at least generally as Ethiopian coffee. Ethiopia is one of the members of the Eastern African Fine Coffees Association, which is highlighting origin as one of the central strategies for improving coffee quality. The EU Coffee Improvement Programme in Ethiopia works towards achieving a higher marketing value for quality coffee, differentiated by identified geographical growth areas. Another example is the Biodivalloc project, which is a French-funded initiative that is looking at GIs as tools to valorise non-timber forest products in Ethiopia, including spices, honey and coffee.

Certainly, GIs may be useful tools to avoid unfair competition, to increase revenues and to establish quality, social and environmental guidelines for coffee production in Ethiopia. Yet, the use of GIs also poses several challenges. The head of the Ethiopian IP Office, in explaining the choice to focus on trademarks, noted his concerns about the adequacy of GIs within the national reality: "Our coffee is grown on four million very small plots of land. Setting up a certification system would have been impracticable and too expensive."⁸ Other experts agree on the difficulties of establishing product specifications, particularly in relation to biodiversity-related criteria. Another potential problem is that, in the context of the WTO, countries are only obliged to

protect GIs that are protected in their country of origin. Ethiopia - in the process of accession to the WTO - does not yet have national rules on GIs, although a Trademark Directive was issued in 1986.

Concluding remarks

On the basis of the experiences described above, it is clear that both trademarks and GIs have significant potential to protect the names used to depict Ethiopian fine coffees. Moreover, certification marks and GIs could play an important role in safeguarding and promoting the country's biodiversity. Biodiversity benefits will not flow automatically. Without social and environmental guidelines, efforts to protect Ethiopian coffee are likely to meet with limited success. The imbalance between retail prices and farmers' income would continue, and increased demand and market compliance might actually harm Ethiopia's biodiversity, reinforcing the trend towards mono-specific forests and the loss of local varieties and knowledge.

It is only through supportive certification, specifications or guidelines that the increased trade in and revenue from coffee brought by trademarks and GIs can advance broader social and environmental goals and strategies in Ethiopia. Such guidelines may ensure transparency, as well as the participation of stakeholders – particularly coffee farmers – thereby resulting in tangible benefits. They also have the potential to promote sustainable and biodiversity-friendly production practices, and to place coffee valuation strategies in the context of national sustainable development goals.

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Endnotes

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- 2 Gole, T.W. et al (2002). "Human Impact on the *Coffea arabica* gene pool in Ethiopia and the Need for its in situ Conservation" in *Managing Plant Genetic Diversity*. J.M.M. Engels, V. Ramanatha Rao. A.H.D. Brown and M.T. Jackson (eds.).
- 3 Roussel, B. and Verdeaux, F. (2007). "Natural Patrimony and Local Communities in Ethiopia: Advantages and Limitations of a System of Geographical Indications". *Africa* 77 (1).
- 4 Gole et al, *supra*. In semi-forest areas, there is some manipulation of local biodiversity through the thinning of over-storey trees, removal of ground vegetation and enrichment of empty spaces. Home gardens and small-scale farms in which coffee is produced also maintain a high level of plant species diversity.
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- 7 Kotecha, S. (2007). "Arabica's Garden of Eden". *Café Europa - Voice of the Speciality Coffee Association of Europe*, No. 31.
- 8 Getachew Mengistie, Director General of the Ethiopian Intellectual Property Office (EIPO), quoted in March, E. (2007). "Making the Origin Count: Two Coffees". *WIPO Magazine* September 2007.
- 9 The author would like to thank Surendra Kotecha and François Verdeaux for their valuable input.

Progress or setback? An African regional instrument to protect traditional knowledge and folklore

By Peter Munyi

During the 13th Session of its Administrative Council in 2006, the African Regional Intellectual Property Organisation (ARIPO) adopted a draft instrument for the protection of traditional knowledge (TK) and expressions of folklore. The draft instrument was adopted against a backdrop of various international initiatives aimed at finding ways and means for the protection of TK and the expression of folklore. At the same time, ARIPO Members also began exploring means and options for the protection of traditional knowledge at the national level, a process that continues today. In Kenya, for example, a taskforce appointed by the Attorney General of ARIPO in 2006 to develop a legal and policy framework of protection of traditional knowledge is still at work.

The importance of TK and folklore in Africa is widely recognised, and African countries have repeatedly called for further protection at the international, regional and national levels. Yet, the adoption of the draft instrument by the ARIPO Administrative Council poses a number of challenges in advancing the debate on the protection of TK in Africa. A fundamental question relates to the effect it will have on the position of the African group in other TK negotiation fora. Secondly, if this draft reflects the ARIPO members' position on the issue, it is potentially divisive as it does not account for all African states.

The draft ARIPO Instrument

The preamble of the draft instrument lays out the general aspirations of the ARIPO members and the rationale for protection. Included in the preamble is a recognition of the intrinsic value of TK and expressions of folklore; acknowledgment of the need to respect TK systems and expressions of folklore; and a stated desire to encourage, reward and protect the authentic tradition-based creativity of traditional and cultural communities.

From the outset, traditional knowledge and expressions of folklore are treated separately in the draft, with the instrument providing different criteria for the protection of each. This is clear from article I, which stipulates that the purpose of the draft instrument is twofold: to protect TK holders against any infringement of their rights; and to protect expressions of folklore against misappropriation, misuse and exploitation beyond their traditional context. A distinction is made between infringement on one hand and misappropriation, misuse and exploitation on the other. In a way, this suggests that expressions of folklore are incapable of being infringed, and TK is incapable of being misappropriated, misused or exploited.

Table 1 compares corresponding provisions for the protection of TK and those for protection of expressions of folklore in the draft instrument without examining the details of each of the provisions.

A review of the table reveals several issues that warrant comment. First, it appears that whereas the rights conferred to TK holders are expressly provided (article 6), this is not the case for expressions of folklore. The difficulty with this stems from the fact that the draft instrument does not attempt to define who the holders of expressions of folklore are to begin with. As such, the draft insinuates that rights (if any) relating to the expression of folklore are incapable of being exclusively held, voluntarily assigned and licensed (article 7), or compulsory licensed (article 11).

Secondly, as concerns remuneration it appears that whereas TK holders may be remunerated directly (and equitably) under article 8, when expressions of folklore are exploited, remuneration is provided through an appropriate authority

(article 21(d)). This raises a host of other issues, chief of which is the management and administration of rights under the draft instrument. National authorities' intervention with regards to TK holders is limited to provisions of assistance that ensure the legality of contracts entered, and the maintenance of registers and other records (article 14). However, administration of expressions of folklore requires the designation of an appropriate authority entrusted with a host of tasks such as awareness-raising, education, monitoring and dispute resolution (article 21(1)). To facilitate the management of TK, shouldn't similar tasks be undertaken?

Thirdly, there are detailed provisions that enumerate measures to be taken to prevent unlawful acts against expressions of

Table 1: Protection on TK and expressions of folklore in the draft ARIPO instrument

	TK	Expressions of folklore
i Protection criteria	✓ (article 3)	✓ (article 15)
ii Protection formalities	✓ (article 4)	✓ (article 16)
iii Beneficiaries of protection	✓ (article 5)	✓ (article 7)
iv Rights conferred	✓ (article 6)	–
v Assignment and licensing	✓ (article 7)	–
vi Equitable remuneration	✓ (article 8)	–
vii Recognition of holders	✓ (article 9)	–
viii Exceptions and limitations	✓ (article 10)	✓ (article 19)
ix Compulsory licensing	✓ (article 11)	–
x Duration of protection	✓ (article 12)	✓ (article 20)
xi Administration and enforcement	✓ (article 13)	–
xii Genetic resources relationship	✓ (article 14)	–
xiii Protection against unlawful acts	–	✓ (article 18)
xiv Management of rights	–	✓ (article 21)

Note: This table excludes general provisions for the protection of traditional knowledge and expressions of folklore, which includes sanctions, remedies and enforcement; regional protection; transitional measures; and, protection under alternative legal mechanisms.

folklore (article 18). Corresponding measures that may be taken to prevent infringement of TK are not stipulated. Finally, the little of the Prior Informed Consent (PIC) process that is specified is very weak. This is not entirely surprising, however, considering that minimal reference of it is made in the preamble.

Preliminary issues arising related to other international instruments and processes

There are international processes underway that are examining ways and means of protecting TK and expressions of folklore. At the global level, these initiatives and fora include the work being undertaken at the World Intellectual Property Organisation (WIPO) Intergovernmental Committee on Genetic Resources, Traditional Knowledge and Folklore (IGC) and the Ad hoc open-ended Working Groups on Access and Benefit Sharing and Article 8(j) (Traditional Knowledge, Innovation and Practices) under the auspices of the Convention on Biological Diversity (CBD). Box 1 lists the elements to be considered at the 9th Conference of the Parties to the CBD to be held in Bonn, Germany in May 2008.

At the regional level, and particularly in Africa, the African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources (Africa Model Law) adopted in 2000 by the African Union was also an attempt to advance the idea of protection of TK in Africa.

International and regional instruments have an important bearing on how TK and expressions of folklore are protected. It is important to note, however, that the ARIPO Member States are also parties to international and regional instruments that are highly relevant for the protection of TK and expressions of folklore. All the ARIPO member states are parties to the Convention on Biological Diversity and thus the CBD.

Box 1: Elements to be considered at CBD COP 9 relating to the protection of TK

- Contribution of WG on 8(j) to the negotiations of an international regime on ABS
- Elements of sui generis systems for the protection of TK
- A code of ethical conduct
- Guidelines for documenting TK

Articles 8(j) and 15 (Access to Genetic Resources) to the CBD are therefore particularly important to consider in the development of the draft instrument. While not binding the provisions of the Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization should have formed part of the constituency to be considered as well.

Corresponding to these instruments are the negotiations and debates taking place in the ad hoc open-ended Working Groups on Access and Benefit Sharing and Article 8(j) under the auspices of the CBD. The outcomes of these negotiations will also invariably affect how TK and expressions of folklore will be protected in future. As Box 1 illustrates, there are a number of important points relating to the protection of TK that still remain up for negotiations under the CBD, which raises the question of whether this draft instrument takes these issues into account.

For a start, the draft does not deal with issues such as documentation of TK and the effects of documentation. Secondly, there are several concerns related to using the Africa Model Law as a basis, guide and model by and for African Union Member States crafting national legislation to protect the rights of local communities, farmers' rights, breeders' rights and

Table 2: Protection of TK: A comparison between the draft ARIPO instrument and the WIPO working document

ARIPO draft instrument: Protection of TK	WIPO/GRTKF/IC/9/5	Some comments/remarks
i Protection criteria (article 3)	Eligibility for protection (article 4)	Both texts match word for word
ii Formalities relating to protection (article 4)	Formalities (article 11)	Article 4 of the draft instrument heavily relies on the wording of article 11 of WIPO/GRTKF/IC/9/5
iii Beneficiaries (article 5)	Beneficiaries (article 5)	The first part of Article 5 of WIPO/GRTKF/IC/9/5 matches article 5 of the draft instrument
iv Rights conferred (article 6)	Fair and equitable benefit- sharing and recognition of knowledge holders (article 6); the principle of PIC (article 7)	Article 6 of the draft instrument heavily relies on the wording of article 6 and 7 of WIPO/GRTKF/IC/9/5
v Assignment and licensing (article 7)	No corresponding article	WIPO/GRTKF/IC/9/5 does not address this issue
vi Equitable remuneration (article 8)	Fair and equitable benefit- sharing and recognition of knowledge holders (article 6)	Article 8 of the draft instrument heavily relies on the wording of article 6 of WIPO/GRTKF/IC/9/5
vii Recognition of holders (article 9)	Fair and equitable benefit- sharing and recognition of knowledge holders (article 6)	Article 9 of the draft instrument heavily relies on the wording of article 6 of WIPO/GRTKF/IC/9/5
viii Exceptions and limitations (article 10)	Exceptions and limitations (article 8)	Article 10 of the draft instrument matches article 8 (1) (i) of WIPO/GRTKF/IC/9/5
ix Compulsory licence (article 11)	No corresponding article	WIPO/GRTKF/IC/9/5 does not address this issue
x Duration of protection (article 12)	Duration of protection (article 9)	The WIPO/GRTKF/IC/9/5 article does not provide for a definite time frame for protection of TK belonging to an individual unlike the article of draft instrument
xi Administration and enforcement (article 13)	Administration and enforcement of protection (article 13)	Article 13 of the draft instrument is very weak in administration and enforcement of TK compared to article 13 of WIPO/GRTKF/IC/9/5
xii Access to TK associated with GR (article 14)	Consistency with the general legal framework (article 12)	Article 14 of the draft instrument matches with the second part of article 12 of WIPO/GRTKF/IC/9/5

regulation of access to biological resources. Not many of the few AU members that have national legislation in these areas have taken the African Model Law into account. Recognising that ARIPO member states are also AU members, there would not have been a better starting point in the consideration of the draft instrument than the African Model Law. Interestingly, the draft instrument departs from the provisions of the African Model Law in several respects. While details of these are beyond the scope of this article, a key difference between these two instruments lies in the approach itself. The African Model Law takes the view that community rights, TK, and biological resources are inextricably linked, whereas, article 14 of the draft instrument illustrates a different approach.

Thirdly, the role of WIPO both as an international organisation as well as the forum for the IGC raises questions. As an institution, WIPO has a mandate to promote the development of measures designed to facilitate the efficient protection of intellectual property throughout the world and to harmonise national legislations in the field. It is in this context its Economic Bureau for Africa in 2005-2006 assisted "in drafting a harmonised regional instrument for the protection of TK and traditional cultural expressions," at the request of ARIPO. While it is within WIPO's mandate to offer technical assistance when requested, it is important to bear in mind that in the recent past, WIPO's technical and legal assistance has been criticized for a variety of reasons, leading to the perception that assistance received may not be 'neutral'.

Finally, through the WIPO IGC, debates and dialogues including the examination of the possible development of an international instrument or instruments to protect TK, genetic resources, and traditional cultural expressions (TCEs)/ (folklore) have been taking place. Table 2 is a comparison of the provisions on the protection of TK from the draft ARIPO instrument and the WIPO Secretariat document WIPO/GRTKF/IC/9/4. Table 3 is an evaluation of the provisions for protection of expressions of folklore from the draft ARIPO instruments as compared to WIPO/GRTKF/9/5. The WIPO documents were issued during the 9th Session of the WIPO IGC in 2006. The intention of the comparison is to gauge whether these WIPO Secretariat documents influenced the outcome of the draft instrument, as it is recognised that the draft instrument is an independent document.

Table 2 demonstrates that the provisions on the protection of TK in the ARIPO draft instrument largely correspond to the WIPO secretariat document WIPO/GRTKF/IC/9/5. However, what also emerges is that, contrary to some provisions of the WIPO document, the draft ARIPO instrument does not put much emphasis on the PIC process. As mentioned earlier, this is a major departure from the often expressed position of the African groups including the ARIPO countries.

Table 3 paints a picture akin to that of Table 2: There is heavy reliance on the WIPO/GRTKF/IC/9/4 text. There are slight departures, but these restrict the flexibility of the draft ARIPO instrument. For example, formalities relating to protection only make provisions for notification, and the holders of rights play a very nominal role in the management of rights.

Conclusions

In principle, the draft ARIPO instrument is useful in advancing the debate on protection of TK and expressions of folklore. However, its potential impact on the protection of traditional knowledge in Africa and on ARIPO member states in their participation and positions in other negotiations processes should not be under-estimated.

First, it is apparent that the WIPO Secretariat documents in the WIPO IGC process have had a tremendous influence on the shape of this draft. This potentially raises questions regarding the nature of technical assistance received, and to what extent provisions in the draft article reflect the particular needs and circumstances of the ARIPO member states.

Secondly, the ARIPO draft reflects a partial aspiration and position of African countries in the negotiation processes. This is potentially divisive and dilutes Africa's position on these issues, particularly given that some of its provisions depart from previously stated positions of African countries in negotiations.

As African countries continue to engage the international community on issues concerning protection of TK and expressions of folklore, it is important that they ensure they do not take actions at the regional level that compromise their negotiating positions at the international one.

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Table 3: Protection of expressions of folklore: A comparison between the draft ARIPO instrument and the WIPO working document

ARIPO draft instrument: protection of expressions of folklore	WIPO/GRTKF/IC/9/4	Comments/remarks
i Protection criteria (article 15)	Subject matter of protection (article 1)	Article 15 of the draft instrument largely follows article 1 of WIPO/GRTKF/IC/9/4
ii Formalities relating to protection (article 16)	Formalities (article 7)	Article 16 of the draft instrument largely follows article 7 (a) and (b) of WIPO/GRTKF/IC/9/4 except that the latter provides in greater detail the process and effect of notification and registration
iii Beneficiaries (article 17)	Beneficiaries (article 2)	Article 2 of WIPO/GRTKF/IC/9/4 does not provide for an appropriate national authority.
iv Protection against unlawful acts (article 18)	Acts of misappropriation (scope of protection) (article 3)	Article 18 of the draft instrument borrows heavily from the language of article 3 of WIPO/GRTKF/IC/9/4
v Exceptions and limitations (article 19)	Exceptions and limitations (article 5)	Article 19 of the draft instrument borrows heavily from the language of article 5 of WIPO/GRTKF/IC/9/4
vi Duration of protection (article 20)	Term of protection (article 6)	Article 20 of the draft instrument largely follows article 6 of WIPO/GRTKF/IC/9/4 except that the latter further makes provision for notified or registered, and secret expressions of folklore
vii Management of rights (article 21)	Management of rights (article 4)	Article 4 of WIPO/GRTKF/IC/9/4 provides for an option of seeking authorization to exploit expression of folklore either from the holders or agency acting at their request, or behalf

Debating biotechnology

By Peter Newell

If there is one lesson from the experience of national and international negotiations on agricultural biotechnology to date, it is that the public does not take kindly to being excluded from decision-making processes or being presented with policy decisions on issues considered important. What we eat and how our food is produced are such important issues. This was most clearly demonstrated in 1999 when imported products containing GMOs provoked a storm of protest in the UK regarding the acceptance of a technology for which the public – and debatably the regulatory system – was unprepared.

Rushed acceptance of a technology provokes strong reactions even in the most desperate of circumstances, as was witnessed in Ecuador and Zambia in the case of GM food aid. Here, even the most fervent advocates of the technology, such as biotech firm Monsanto, were forced to concede that a measure of arrogance surrounding the benefits of the technology had blinded governments and firms alike to the sources of public anxiety and distrust about its use. The long-term damage to trust in the technology has been incalculable.

A second lesson gained from global experiences with agricultural biotechnology policies is that public trust established under democratic contexts is essential to gaining support for regulation. The benefits associated with getting the process right in the short term far out-weigh the costs that result from getting it wrong: that is, outright rejection of the technology and the system of regulation that is seen to support it. As much as those that assert biotechnology's incredible potential to benefit the poor and produce favourable environmental outcomes may be frustrated by the need to keep innovation and regulation in line with societal expectations about where need lies and where ethical boundaries operate, the costs of excluding and antagonising the public are far greater to regulatory and technology development.

Article 23 (Public Awareness and Participation) of the Cartagena Protocol on Biosafety makes clear the need for governments to establish mechanisms of public participation and consultation and to engage in efforts to raise awareness about biosafety issues as a pre-requisite to effective public engagement. This inclusion is unsurprising given the level of political conflict present at the time that the protocol was negotiated.

In this article, I draw a few key lessons that remain relevant today based on work I undertook as part of a team commissioned in 2003 to review countries' efforts to implement Article 23 of the Cartagena Protocol.¹

Contexts matter

There can be no universal prescription or formula on 'how to do' public participation in different national contexts. What works in some places is not going to work in others. Countries need to consider the sort of processes that are useful in achieving the overall goals they have identified (see Box 1). These objectives need to reflect the political and resource constraints they face. In Denmark, for instance, there is a strong tradition of extensive participation at all levels of society with the resources and capacity to match. This is reflected in the in-depth consultative activities carried out by the Danish Board of Technology.

In Kenya and Zimbabwe, on the other hand, while there have been concerted attempts to engage civil society in the development of biosafety frameworks – reflecting traditions of participation in these countries – the resource and capacity constraints are serious issues. Public participation processes must therefore account for the different situations, capabilities and stages of development in each country.

'Participation' is often interpreted to mean providing information to the public

Countries are generally focused more on awareness-raising and educational activities than on enabling participatory consultations and inclusive decision-making. Information sharing is an essential building block of participatory processes but if all the stages of these processes are to be designed, facilitated and sustained effectively, information-gathering is also needed. To know what sort of information must be provided, in which format and to whom, a government needs first to know who the interested public is, what its concerns are and what access it has to different kinds of information or media.

There is a range of participatory techniques and approaches for gathering information, though not all are equally accessible to every interested party or participant. Access to information-technology communication, for example, is very limited for most people in large parts of Africa, Asia and Latin America. In other countries, there is a plurality of information sources but their neutrality and independence is often questioned. Governments should therefore take a proactive role in widely distributing strategic information to the public about their rights as citizens and consumers and how to exercise them, as well as basic background information on relevant policy issues – in this case, biosafety and biotechnology.

The role of 'experts' in participatory processes, though important, has to be managed carefully

When experts occupy leadership roles it can make it difficult for other stakeholders and interest groups to independently evaluate or define issues that concern them. Moreover, despite the frequent separation between public participation and risk assessment, it is clear that one cannot be neatly detached from the other. For example, even seemingly technical questions about what counts as a risk implies a political and social challenge of establishing who defines the risk and how the risks are expected to be distributed. These are not narrowly defined technical problems reserved for only experts but political questions that have to be treated as such.

There are many purposes, processes and outcomes of participation

As opposed to consensus, there are often entrenched and irreconcilable conflicts between a public with contrasting interests. Uncovering differences, however, helps to make clear the trade-offs and costs involved in choosing one option over another (see Box 1). Therefore, an open, transparent and inclusive process can still achieve broad legitimacy and acceptance, even if some parties involved do not agree with the eventual outcomes.

The sole intention of public inclusion in policy-making is not to obtain consensus; public participation can serve different purposes. In the case of biosafety and biotechnology, it can enable a 'market-research' function to ensure that biotechnologies are accepted by a sceptical and worried public or it can deepen a democratic process in which citizens are entitled to know about the impact of technologies on their economy, society and environment and to make their views known.

In any public participation process, it is important to determine and communicate the purpose and expected follow up - that is, how decisions will be taken forward or acted upon. Clarity and honesty are necessary to avoid a situation in which people are asked to lend credence to decisions that, in reality, have already been made. The purpose of public participation shapes what approaches are likely to be most useful. For example, opinion polls about the adequacy of biosafety regulations give a snapshot picture of whether there is public trust in a regulatory system, but they do not involve the public in how decisions are made.

It is vital that actors convening participatory processes take into account all the relevant stakeholders. Yet, identifying stakeholders is more complex than commonly imagined. There is no simple, proven method for stakeholder analysis in the formulation and implementation of policy. It is necessary to consider how stakeholders are identified and by whom; the heterogeneity of interests and knowledge that stakeholders bring to the process; the fact that different stakeholders will want or need to be involved at different stages in the process; and that it is probably neither desirable nor feasible for all stakeholders to be involved at all stages.

The expectation is that the governments lead participatory processes. Some countries have a law of public participation, such as in Bolivia. Laws on the right to information, as in Norway or the Aarhus Convention, make it easier for the public to be meaningfully involved in decision-making about biotechnology. Spaces or opportunities for public participation, however, can also be created in a complimentary fashion by other actors such as NGOs. For example, citizen juries as we have seen in India and Brazil can be very effective at identifying the concerns of groups - such as poorer farmers - that are often overlooked in government-led consultations.

A Final Word

Given the potential risks and benefits associated with agricultural biotechnology, it is important to put decisions within a broader context of public policy debate about the future of food and agriculture, especially in developing countries. As consumers, employees, parents, producers and citizens, the public has a right to be involved in decisions that have the potential to profoundly affect the way they live. While all governments have an obligation to encourage public consultation and participation in the design of biosafety policies under the Cartagena Protocol, unfortunately only a few have used the opportunity to launch a wider public debate about agricultural futures in their countries in which biotech may, or may not, have a key role to play. Using a variety of methods of public participation tailored to national needs and resource constraints, governments can seek to weigh the pros and cons of different agricultural strategies, moving from questions about whether to adopt biotechnology to critical questions about what economic, social or environmental needs biotechnology can and cannot address. Though particularly focused on the ways in which the public can be brought into biosafety decision-making, these tools, strategies and lessons can, for the most part, also apply to decision-making around related trade, intellectual property and broader agricultural issues.

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¹ The other authors were Dominic Glover, James Keeley and Rosemary McGee. The full report is available at: <http://www.unep.org/biosafety/Documents/PublicParticipationIDS.pdf>

Box 1 - Linking policy objectives, tools and public participation

Policy objective	Process/Key decisions	Tools
Economic Growth	Which domestic producers could benefit and how? Which export markets could be accessed? What are the pros and cons of different technology pathways? (economic gain, environmental and social costs)	National independent commission on biotechnology and the national economy Public hearings from experts, stakeholders and those with relevant experience from other countries that have adopted related strategies Media campaigns to advertise public meetings and to encourage debate about the pros and cons of different growth-oriented strategies
Sustainability	Which types of sustainability are to be enhanced? What contributions might biotechnology make? What are the trade-offs across the economic, social and environmental pillars of sustainability?	National commission on biotechnology and sustainability with a mandate to solicit views from stakeholders Citizen's panel with rotating representation to provide inputs at key moments in the process Focus groups to deepen understanding and discussion of key policy trade-offs. Results compiled in a report for public discussion
Food Security	What sort of agricultural base does the country want/need in 10-20 years time? What should be the balance of public-private and foreign-national investment? How to incentivise pro-poor applications of biotech? Does the infrastructure exist to deliver the technology to smallholder farmers?	Demand-driven public information campaign on different technologies for combating food insecurity Independent panel on agricultural futures Complementary citizen panels on pros and cons of different agro-technology paths Consultation on appropriate policy tools to encourage research and development in biotechnology Participatory evaluations of rural infrastructure and outreach to farmers
Food Safety	Whose food safety standards should be adopted? Is there adequate capacity to ensure this safety? What are the costs and benefits of increasing food safety? (for producers, consumers)	Government led review of international food safety standards Public information campaign about the ability of biotech applications to increase food safety Public hearings involving experts and lay stakeholders Multi-criteria mapping to weigh importance of pros and cons of technology choices

Biofuels and sustainability: Is certification the answer?

Biofuels mandates and targets have come increasingly under fire from both development and environment groups, which say they have unintended consequences, driving up global food prices, encouraging conversion of forested land to monocultures, and leading to the exploitation of labourers in developing countries. One way to place some checks and balances on biofuels production is by using sustainability certification schemes. BioRes has talked to two biofuels experts to get their opinions on the topic.

Background

There are a number of national and international efforts to develop biofuel sustainability criteria. The global Roundtable on Sustainable Biofuels, which brings together stakeholders to develop a consensus on principles and criteria to achieve sustainable biofuels, is one such effort. The Roundtable has proposed the following environmental and social justice principles: the use of biofuels should reduce greenhouse gas emissions; production should not endanger wildlife, areas of high conservation value or the environment; production should not violate human rights or labour rights; production should not impair food security; and production should not violate land or water rights and should contribute to the development of local, rural and indigenous communities.

The Roundtable's principles provide insight into what the world is demanding from governments as they consider laws increasing the use of biofuels. The EU is targeting a ten percent biofuel blend in transport fuels by 2020. The US has enacted the Energy Policy Act of 2007, which calls for 36 billion gallons of biofuel to be used in vehicle fuel by 2022. The European Commission, the US, and the Sustainable Production of Biomass Project Group (Project Group), a project commissioned by the Dutch government, are among entities involved in trying to operationalise some form of biofuels criteria. The following paragraphs look at some of the potential criteria.

Greenhouse Gas Emission Savings: The Commission's proposal requires an emissions saving of at least 35 percent. The US requires renewable fuels to achieve at least a 20 percent reduction, advanced biofuels and biomass-based diesel at least a 50 percent reduction, and cellulosic biofuels at least a 60 percent reduction. The Project Group would require a 30 percent reduction, increasing to 80 or 90 percent within the next decade as new technology is developed and agricultural production is improved.

Conservation, Biodiversity and Environmental Protection: The Commission would prohibit the use of raw materials cultivated from land with high biodiversity or high carbon stock. Domestically produced raw materials would be required to comply with EU environmental requirements for good agricultural practices as well. Member states have the option of considering other grounds of sustainability. The US requires the Administrator of the Environmental Protection Agency to consider environmental impacts when setting future volume levels (e.g. beyond 2022). The Project Group would require production facilities to comply with national and local environmental regulations and apply good practices to strengthen biodiversity and best practices to protect soil, water and air resources.

Human and Labour Rights, Land and Water Rights: The Project Group would require production to contribute to the well-being of employees and the local population through compliance with international principles. Furthermore,

there should be no negative effects on working conditions or human rights, and property rights should not be violated.

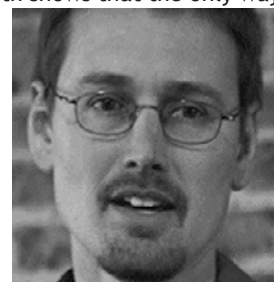
Food Security: Impacts of biofuel production and use on food security is complex, which may explain why the impacts in the Commission's Proposal, US law and the Project Group's framework is considered during the programme review process. The Commission's proposal requires it to monitor commodity price changes and their effects on food security and propose corrective action if necessary. Under US law, the EPA Administrator is to conduct an analysis of the impacts of the production and use of renewable fuels on the price and supply of agricultural commodities and food prices and, the National Academy of Sciences is to conduct an impact study on industries related to the production of agriculture industries, and to develop policy options to alleviate adverse impacts on agricultural feedstocks and capabilities. The Project Group would require information to be collected concerning land use and food price changes in the production region.

Socio-economic Development: Like food security, the affects on socio-economic development are complex and depend on a number of factors. The Commission is to report on the availability of foodstuffs in exporting countries, the ability of developing countries to afford foodstuffs and broader development issues, and to propose corrective action. Under US law, when the Administrator sets volume levels for future calendar years, he or she is to conduct an analysis of the impacts of the production and use of renewable fuels on job creation and rural economic development. The Project Group would require a positive contribution to the local economy.

Interview with Adrian Bebb, Agrofuels Campaign Coordinator for Friends of the Earth Europe

BioRes: What are the main pros and cons of biofuel sustainability schemes?

AB: Research by Friends of the Earth shows that the only way to make production sustainable is by controlling the level of demand to sustainable levels. None of the sustainability schemes that we have investigated address this issue, therefore undermining their credibility and adding weight to accusations that they are simply green-wash schemes for big business. A good example is the Roundtable on Responsible Soy, which is dominated by companies that have a substantial control of the international soy trade but have no interest in reducing soy production to more sustainable levels. A second major criticism is the inability of certification schemes to solve indirect issues such as rising commodity prices or



displacement. Expanding crops to meet new demand replaces previous uses of that land, whether it was nature, pastoral or agricultural land. The latter is often displaced elsewhere and is one of the major concerns in relation to the production of agrofuels (or any other major expansion of a commodity crop). The new plantation could be certified as "sustainable" but if it has simply pushed other farming activities into sensitive areas then this makes a mockery of any certification scheme. This is a major failing that is unlikely to ever be solved by certification schemes. Friends of the Earth is therefore concerned that the public will be sold products under the impression that they are "sustainable" or "responsible" when the opposite is true.

BioRes: How would such schemes affect the balance between homegrown and imported biofuels and biofuel feedstocks?

AB: The European Union scheme currently under development sets the greenhouse gas savings particularly low (35 percent) in order to allow EU-grown crops to qualify. A higher saving would be better for the climate but would rule out most EU crops, which have a generally low energy balance.

BioRes: In your opinion, are national biofuel sustainability requirements compatible with WTO obligations? If not, are there any alternative ways to ensure the sustainable production of biofuels that would comply with WTO obligations?

AB: FOE has not investigated the WTO compatibility of the UK scheme (the only national scheme currently in force). What is clear though is that most countries, and the European Commission in particular, appear to be running scared of the WTO and intend to only implement weak sustainability criteria (especially in relation to social aspects) as a result. There is a tendency to depend more on voluntary schemes with mandatory reporting - an approach that FOE considers weak and unacceptable.

BioRes: In your opinion, will large-scale production and use of biofuels become a reality? What part would trade play under such a scenario?

AB: Large-scale production is already happening whether we like it or not, with major expansions planned largely in the South to meet, at least, the European market. However, the increasing attention to the global food crisis and the role agrofuels have in exacerbating the situation has led governments and the European Commission to review their policies. There won't be enough agricultural land (or water!) available to produce feeds, fuels and foods for a growing population, especially if climate predictions come true. Some hard choices will have to be made and it is unlikely that agrofuels will come out favourably. Some level of biofuel production will be available, especially from waste products such as used vegetable oil, but what level that will be at is highly questionable - certainly below the proposed 10 percent target.

BioRes spoke to Marcelo M. R. Moreira, Researcher at ICONE, the Institute for International Trade Negotiations in São Paulo, Brazil.

BioRes: What are the main pros and cons of biofuel sustainability schemes?

MM: When ethanol was first implemented in Brazil (in the 1970s), the main objective was to guarantee a national fuel supply, so sustainability schemes were mainly designed to control gas and liquid emissions. Broader



sustainability issues are of greater concern nowadays and sustainability stamps are being studied by two Brazilian government agencies and by the private sector. Nevertheless, identifying criteria that ensure environmental benefits is not an easy task, especially with respect to traceability systems. Biodiesel is required to carry a 'green stamp' with environmental and social standards (specifying region of origin and family-farm production) in order to be sold in the public fuel distribution market in Brazil. Critics point out the inviability of reducing greenhouse gas emissions through biodiesel usage without achieving large-scale production, which is very difficult through small-scale family farm sourcing.

BioRes: How would such schemes affect the balance between homegrown and imported biofuels and biofuel feedstocks?

MM: Brazil has a long experience in biofuel production and consumption, without needing to import these. Concerning ethanol, the country has developed world leading technology in terms of costs, but also in sustainability aspects such as yields per hectare, energy balance and greenhouse gas reductions. So, if sustainable production were treated as it ought to be (i.e. not as an excuse to raise trade barriers), Brazilian exports would benefit. As for biodiesel, large scale consumption might imply some adjustments on seal requirements.

BioRes: In your opinion, are national biofuel sustainability requirements compatible with WTO obligations? If not, are there any alternative ways to ensure the sustainable production of biofuels that would comply with WTO obligations?

MM: Brazil is itself able to supply its domestic demand for biofuels, and there is almost no import demand. Brazil is engaged in discussions regarding sustainability criteria for ethanol production, focusing on environmental and social aspects. WTO compliance is a question that needs to be addressed carefully. The sustainability requirements imposed by importing countries may be a concern, and their requirements could be challenged against WTO compliance. I can name at least eight different initiatives seeking to define sustainability aspects of biofuels today, and it is not easy to foresee what set of criteria importer will recognise and implement. If the US, the EU and other countries are really interested in sustainability, one can say that Brazil is doing a good job. The key question is: will the sustainability requirements really be needed to achieve sustainability goals, or will they just amount to barriers to trade? The harmonisation between different certification schemes is another tough issue to address since there are plenty of initiatives and a "certification market" is emerging.

BioRes: In your opinion, will large-scale production and use of biofuels become a reality? Can biofuels be a reliable and sustainable fuel source used by all countries? What part would trade play under such a scenario?

MM: From a Brazilian perspective, biofuels are a permanent part of the national energy matrix, which can also create a global biofuel market, assuming key producers become engaged. It is known that in the case of sugarcane-based ethanol, the countries that offer the best conditions are developing and least developing countries, mainly in Latin America, the Caribbean and Africa. Since developed countries are the major oil consumers and have severe area constraints, international trade assumes a very important role. It would allow the best production patterns and, at the same time, provide incentives for technological and infrastructure development, as well as income generation, in the poorest countries. Significant trade flows, with diversified production through biofuels commoditisation, would generate conditions for establishing reliable supply.

Sticky sticker situation: Food miles, carbon labelling and development

By Caitlin Zaino

Climate-conscious consumers want to cut their carbon footprints. Retailers have responded, initially, labelling air freighted produce with an airplane. But this simplistic strategy hit developing country producers in an unfair way, and today schemes to consider the full carbon lifecycle of goods are underway.

Local food movements, which encourage consumers to buy food produced in their communities in order to support local farmers, and to eat fresh, in-season food are proliferating. Partially overlapping with this movement is an increasing awareness among consumers that what they buy affects the global climate. Supermarkets throughout the world have responded to the escalating trend by labelling products with a "food miles" sticker to indicate their immigrant status. Yet, scaling back on fresh fruits from abroad to reduce food miles is not necessarily the most efficient or development-oriented solution to minimising carbon emissions. When it comes to local versus global foods, social, economic and environmental issues abound.

Simply put, food miles are the distance that food travels from the field where it was grown to the plate where it is consumed. The objective in measuring these distances is to determine the environmental impact based on the carbon emitted during transport, whether by air, sea, lorry or car. Most bulk products are shipped by sea; fresh produce, however, needs to reach the consumer quickly and airfreight is the only option. The carbon emissions associated with air freighted products are high - 177 times greater than for products being shipped by sea. This means that mangos from Brazil, strawberries from Kenya, and asparagus from Mexico being sent to European supermarkets have a significant environmental impact based on the miles they have travelled to reach their final destination. Among all food products transported internationally, the most miles are clocked by these out-of-season fruits and vegetables arriving from distant countries.

For many governments, supermarkets, and even some environmental advocates the simple solution to reducing the carbon miles generated by food travel is to buy locally. In supermarkets throughout Europe, fresh produce from abroad is being labelled with a sticker depicting an airplane to alert consumers that it was imported via air freight. The policy behind this labelling is to encourage consumers to purchase local products and also to provide incentives to the company itself to source as much food locally as possible, to grow local supply networks, and to offset carbon emissions from air freighted products. Labelling pineapples with stickers or buying only local, in-season produce isn't necessarily

the appropriate solution for lessening carbon footprints, however.

Food miles capture only part of the picture

In most countries, even food produced nationally travels extensively before getting to retailers. While these trips are made by lorry as opposed to airplane, the carbon emitted during cross-country tours is not negligible. Add in the cars used by most consumers to get from their homes to the market, and the carbon footprint is on par with that of air freighted products.

Another major challenge with buying local is that transport is only part of the equation. Agricultural methods used in producing food, the types of processing manufacturers use and storage methods also play an important role. Studies have shown, for instance, that lamb grown in the UK and sold locally has a greater carbon footprint than lamb grown in New Zealand, 11,000 miles away. This is because New Zealand uses more energy efficient and environmentally-friendly methods for raising its lamb than the UK does.

Beyond the environmental aspects of food miles, there are social implications to be considered. Development advocates say it does not make sense to halt air freighted products and encourage local food production, as this would hurt the poorest suppliers in least-developed and developing countries that rely heavily on revenue from exported products. Growing fresh produce provides a crucial source of income for the poorest of the poor in these already vulnerable countries and countless livelihoods would be at stake. The fresh fruit and vegetable trade with the UK, for instance, generates 400 million USD that supports one million people living in Africa. If developed countries were to buy only locally, the development implications would be significant.

Furthermore, when governments and companies shift their policies to increase locally sourced foods, they are also dangerously close to challenging WTO anti-protectionism rules, particularly the most-favoured nation status (MFN) that prohibits nations from discriminating between their trading partners. Some say that MFN rules could be violated if an importing nation discriminates against another country based solely on the distance the exports need to travel.

Development advocates argue that emissions related to food imports from poor nations are manageable and not necessarily larger than those of locally grown foods. According to the UK department for International Development (DfID), "emissions produced by growing flowers in Kenya and flying them to the UK can be less than a fifth of those grown in heated and lighted greenhouses in Holland."

From food miles to lifecycle analysis

The failure of the local food miles movements to account for social implications has caused many in the trade and development community to critique the concept. So too have some environmentalists that believe the idea is too simplistic in its focus on carbon emitted solely during transport. These critics are instead calling for a full life cycle carbon footprint analysis; that is, measuring the carbon emissions from the field to the plate by accounting for agricultural methods, processing, energy, soil, distribution and everything in between. The full life cycle is a kind of cradle-to-grave approach for determining the carbon impact of foodstuffs. As this calculation is based not only on miles travelled but on carbon emitted during the entire production process, it is less likely to discriminate against developing country exports the way food miles schemes have done.

In response to the demand for this more holistic measurement, some companies are implementing carbon labelling programmes. Labelling standards that ensure consistency and comparability among products carrying the tag are being created by the Carbon Trust, a private company established by the UK government to help Britain move towards a low carbon economy. The Carbon Trust is working to develop an agreed method to measure the embodied greenhouse gases among a wide range of products. Once calculated, the label will show the amount of carbon in grams much like the nutrition label provides the amount of sodium or fat in foods.

For companies in the food industry, carbon labelling makes financial sense over time. While applying the schemes can be exhaustive and expensive, the energy savings they encourage will ultimately lead to economic efficiency. Any carbon cutbacks are likely to save money in the long run. "More and more, businesses are looking for ways to reduce their impact on the environment," said the UK's environment minister, Ian Pearson. "To help them achieve that we need a reliable, consistent way to measure these impacts that businesses recognise, trust and understand."

The standards and the labels are still in their trial stages. Once the standard is in place, manufacturers can voluntarily sign up to have their products carry the label. The process of certification and monitoring will be handled by independent companies to ensure that manufactures are adhering to the standards.

Arriving in a store close to you?

Carbon labelling has taken off in Europe, with initiatives in Sweden, France and the UK. In January 2007, Tesco – one of the UK's largest supermarket chains – announced a plan to put a carbon label on 70,000 of its

products. Together with Carbon Trust, Tesco is working to map carbon footprints. Launched in late April this year, the first 20 labelled goods include Tesco's own-brand products in four different categories: orange juice, potatoes, washing detergent and light bulbs. The standards applied by the company are based on those established by the Carbon Trust, the UK environment department and BSI British Standards. The supermarket giant said that it wants not only to revolutionise its business, but also seeks to lay the groundwork for carbon labelling schemes nationally and internationally. Tesco's chief executive, Sir Terry Leahy, promised "a revolution in green consumption." "I am not a scientist," he said, "But I listen when the scientists say that if we fail to mitigate climate change, the environmental, social and economic consequences will be stark and severe."

In spite of its self-proclaimed dedication, Tesco has encountered a number of daunting obstacles in applying the carbon labelling scheme. Difficult questions such as whether a carbon footprint continues to grow even after the product has hit the supermarket shelf have plagued the standard-setting work. Challenges related to the complexities of calculating an accurate carbon footprint for each product during its life cycle have also arisen. But the company insists it is devoted, despite scaling back its original commitment from 70,000 products to 20, at least in the short term. "I don't deny it's difficult. But that isn't to deny that it is worth doing," said Brenda Boardman, an academic at Oxford University who is helping to develop the project with Tesco.

Concluding remarks

Carbon labelling schemes, today at their very initial stages, raise complex and challenging questions in relation to trade and sustainable development. Focusing on just one aspect of the carbon footprint, the first experiments related to food miles lost the bigger picture and ended up hurting developing countries. The initial focus of labelling schemes on foods rather than manufactured goods also introduced a bias. The main reason for the food focus was that the lifecycles of manufactured and processed goods are longer and more complex than those of agricultural goods. In the future, this bias would have to be rectified. In addition, the carbon labelling schemes must reconcile the need for accurate and useful data with the need to be simple, transparent and involve sufficiently low transaction costs. Otherwise, small countries and players risk being left behind.

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Raising agricultural productivity in Africa: The energy challenge

By Moustapha Kamal Gueye

Africa faces daunting challenges with regard both to the future of agriculture and energy supply. Strategically targeted and used, bioenergy could provide part of the solution.

Agriculture in most African countries is characterised by a dual system combining a subsistence farming sector, revolving around staple food crops such as millet, sorghum, cassava and rice, with an export-oriented sector, producing crops such as cotton, groundnuts, cocoa, and coffee. Over the years, the export sector has come to dominate agricultural production, mobilising most investment in infrastructure, irrigation, fertilisers and credit. Given the relatively high foreign exchange revenues generated by export crops, a number of countries have pursued a policy of using such revenue to import cereals from the international market. As a result - despite the fact that cereals are a staple food in many countries providing from 60 to 80 percent of caloric intake - consumption has been essentially import-dependent. This policy was rendered possible by the low food prices on the international market, driven by surplus production in the US, the EU and other producing countries in Asia.

Overall, the productivity of African agriculture has remained low, both in the food producing and export sector, as a result of a combination of endogenous and exogenous factors. The latter relate, in particular, to the international trade and economic system that allowed producer and export subsidies in industrial countries - estimated at 350 billion USD in 2005. The effect of such subsidies has been an artificial lowering of production costs in Northern countries, rendering African production uncompetitive even in their own domestic markets. African agriculture has stagnated as the result, with human and other productive capacity moving away from the sector. A number of other internal factors have contributed to the stagnation of agriculture in Africa, many having to do with policy and technical obstacles to increasing production and productivity.

The recent hikes in world food prices have thrown many developing countries, especially net food importing countries, into a state of market turbulence with profound social, economic and political implications. In the course of the past two years, import bills have significantly risen, making it extremely difficult for many countries to keep up with the price of cereals. The UN Food and Agriculture Organisation (FAO) estimates that the cost of grain imports will increase by 56 percent in 2007/2008, following an already significant rise of 37 percent in 2006/2007. In poor and food-deficient African countries, the cost of cereal imports is expected to soar by 74 percent.

Affected countries and the international community at large are concerned with finding urgent responses to food shortages, or rather, to making food accessible in certain parts of the world. There is, however, need to reconsider the many structural problems, both internal and external, that must be addressed in order to find a long-term solution to the agricultural crisis in Africa. The key challenge is to raise agricultural productivity and production, especially in poor food importing countries in order to reduce import dependence, and thereby reduce vulnerability to market volatility.

Low productive capacity is persistent in the most vulnerable countries. In the Sahel region, within the ten years from the late 1980s to the late 1990s, per capita agricultural output fell by six percent, while total cereal imports grew by 65 percent, with a per capita growth of 32 percent. As a result, food insecurity remains a daily concern for 40 percent of the population, affecting the most vulnerable: women, children, rural households in dry areas, and urban and rural households headed by single women.

Increasing agricultural productivity: How to get there?

A range of strategies and policies for increasing agricultural production and productivity have been considered in the various parts of Africa and by development institutions. In its agriculture come-back report of 2008, the World Bank noted that for agriculture to develop as the basis for economic growth, an agricultural revolution in the productivity of small-scale producers is required. Meanwhile, member countries of the West African Economic and Monetary Union (WAEMU) stressed the need to increase production and productivity, while ensuring the sustainability and the preservation of the natural resource in their common agricultural policy. The urgency of increasing productivity was also recognised in the strategic framework for food security in the Sahel by 2015, adopted by the Inter-State Committee to Combat Drought in the Sahel (CILSS) in 2002.

The policy interventions included in the plans and strategies seem to cluster around the improvement of infrastructure to link rural areas with markets, the development of seed banks and greater access to credit. They also involve improving access to water and control of water use; modernising production systems through the introduction of efficient machinery where required; and increasing the use of mineral and organic fertilisers to provide nutrients

to the soils and boost yield. The agricultural productive systems in Africa are deficient in all these areas.

The following paragraphs focus on measures related to water, machinery and fertilizer considered in existing regional and national plans, and discuss their energy dimension.

- i) **Access to water remains a great challenge.** Overall, it is estimated that only four percent of the total agricultural land in Africa is irrigated, the remaining parts being rain-fed, and therefore subject to climate and rain variability. Since the late 1980s the use of irrigation systems employing small water pumps has expanded, with policies seeking their further development. Presently, the use of motor pumps remains concentrated in the northern and southern parts of Africa, which are the most arid regions - but also the most developed.
- ii) **The level of mechanisation of African agriculture is extremely low.** While recent data is not easily available, in 1994 the World Resources Institute estimated that African agriculture employed a total of 544,757 tractors, compared to 1,125,596 in Latin America and 10,384,879 in Europe. There were 387 agricultural workers per tractor in Africa, compared to 36 in Latin America and 3 in Europe, with a world average of 56 workers per tractor. There are different views as to whether a mechanised model of agriculture is appropriate or not for Africa. Expanding mechanisation does, however, feature as a top priority in policies being considered in several countries.
- iii) **Finally, with respect to nutrients, Sub-Saharan Africa has the world's lowest level of mineral fertilizer use.** Only eight kilograms of nutrients are applied per hectare. This represents about ten percent of the world average. It is estimated that Sub-Saharan Africa imports more than 90 percent of its agricultural fertilisers. In 2006, the African Union, meeting at a special summit on fertilisers in Africa, set the objective of increasing fertiliser usage from the current average of eight kg of nutrients per hectare to at least 50 kilograms per hectare by 2015. Again, views diverge as to whether expanding fertiliser use is the right way to go, given all potentially associated environmental, safety and other effects.

In considering the three types of interventions outlined above, it appears that all are directly or indirectly associated with energy use. Therefore, it is critical for policies in these areas to be associated with an effort to secure access to affordable and sustainable sources of energy.

The Energy Challenge in raising agricultural productivity

Energy is an essential aspect of agricultural production. Energy is required directly as a fuel to operate agricultural machinery such as tractors and harvesters as well as for operating irrigation systems and pumps running on electricity, diesel or other sources of energy. Energy is also required in processing and conserving agricultural products, and in transportation and storage. Therefore, energy is a critical factor in adding value in the agricultural sector.

Indirect energy use occurs through the production and application of mineral fertilisers and chemicals required to improve crop yields.

Policies being considered within the three categories of interventions described above would imply greater use of energy in the agricultural sector. In Mali, for example, a programme for economic and social development in progress would double the stock of existing agricultural machinery. The number of tractors would increase from an estimated 1,500 tractors to 3,000; motor cultivators from 500 to 1000; and motor pumps from 5,000 to 10,000 by 2012. Similar policy objectives have been set in other African countries.

In the current context of rising oil prices, many of these plans could be jeopardised. Already, oil import bills in several African countries have risen to 50 percent of export earnings, and many countries are struggling just to meet their current energy needs. Accessing energy to fuel the objectives of development of the agricultural sector in Africa therefore represents a major challenge in the current context of high oil prices. As such, the energy crisis is not only a problem in itself; it is also a hurdle in addressing the food crisis in Africa.

Tackling energy in order to boost food production has a long history. Some claim that India managed to solve its food shortage problem and achieve self-sufficiency in food grains partly thanks to a policy to provide farmers with electricity for free, allowing them to irrigate their land. While there are differing views regarding the effectiveness of the policy and concerns over side effects such as overuse of underground water, the policy has been recognised as one of the instruments that led to rapid increase in food production in several Indian states, most notably in the state of Punjab.

Can biofuels be part of the answer?

The agricultural sector is emerging as an important energy consumer, but also as a potential source of energy generated from products and by-products of the agriculture and forestry sectors. The production of energy from agriculture is at the centre of the present boom in bioenergy. Indeed, most biofuels produced today originate in the agricultural sector.

A range of crops produced in Africa could be used to make biofuels - sugar cane, sugar beet, maize, sorghum and cassava for ethanol production - while peanuts, jatropha and palm oil can be used to produce biodiesel. There are many opportunities to generate new sources of energy that can be integrated into existing production patterns within the agro-forestry sector and to meet rural energy needs. According to estimates produced by scientists from the International Energy Agency's Bioenergy Task 40, Africa's sustainable bioenergy potential in 2050 is between 317 and 410 Exajoules of energy. This is close to the World Energy Council estimate of global total annual primary energy consumption of 450 EJ in 2007.

Tapping this potential could help countries decrease their heavy oil import dependence. It could also contribute to meeting the energy requirements of the agricultural sector,

and the energy needs associated with rural electrification and development objectives. However, there is an inherent challenge in using food crops for energy. African countries are already victims of the effects of diverting the production of cereals such as maize, soya and wheat to produce biofuels in other parts of the world. Therefore, it would make sense to focus on the significant potential of non-food crops such as jatropha, or the vast agricultural and forest residues to generate energy.

Jatropha curcas is one of the feedstocks receiving much attention. The plant is widely available throughout Africa. It has traditionally been used in hedges for protection or delineation of agricultural parcels. It has the ability to grow on poor lands and is drought-resistant, making it well-adapted to conditions in several parts of Africa. Even in the dry regions of Africa, countries such as in Mali, Niger and Senegal, are setting up programmes and initiatives to develop modern forms of bioenergy focusing on jatropha.

In Niger, it is estimated that by integrating jatropha plantations in the agro forestry sector, approximately 953,401 ha - which represents one percent of the territory - could be devoted to jatropha plantations. This would still leave aside protected areas and forest reserves totalling 313,599 ha. In Senegal, a national biofuels programme started in 2006, with the goal of seeks planting 321,000 ha of jatropha at a rate of 1,000 ha per rural community. This would lead to 3,200,000 tonnes of seeds per year by 2012, resulting in 1,190,000,000 gallons of straight jatropha oil, or 1,134,000,000 litres of refined oil that could be used as biodiesel. By 2012, thanks in large part to biofuels, the Senegalese agriculture sector should be a net energy producer. In Mali, several experiments conducted over the past years have shown the potential of using jatropha oil for agricultural production and rural electrification while reaping this plant's positive environmental and social impacts.

Today, successful experiences exist in several parts of Africa in generating bioenergy from the agricultural system, with the objective of contributing to the energy requirements of agricultural production - powering water pumping systems, running multifunctional platforms, and generating electricity in rural areas. If bioenergy could be developed in ways that do not undermine the already fragile agricultural system, but rather in ways that integrate adequately energy and food crops, it could play an important role in meeting the energy challenge of increasing productivity.

To that effect, African countries would need to formulate clear strategies and policies that take into account the various socio-economic and environmental implications of integrating energy and agriculture production, such that the ultimate outcomes effectively contribute to the range of actions needed for the long-term sustainability of agriculture in Africa.

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Commission on Sustainable Development: CSD-16 2008 Review Session

The UN Commission on Sustainable Development (CSD) was established in 1992 to report on implementation of the Earth Summit Agreements - Agenda 21, the Rio Declaration on Environment and Development, and the Statement of Principles for the Sustainable Management of Forests. The CSD meets annually as part of two-year cycles that focus on specific themes and cross-sector issues. The 2008/2009 cycle focuses on Africa, agriculture, rural development, land, drought, and desertification. Each theme, while independent, presents a number of cross-sector issues that policymakers must understand and consider in order to advance global sustainability objectives.

Africa is included as a CSD thematic cluster because of the particular relevance of agriculture, rural development, land, drought and desertification to African economies and economic well-being.

Agriculture and rural development

Most African economies continue to rely on rural agricultural production. Therefore, any effort to eradicate poverty will require increased agricultural productivity and rural development. As such, Agenda 21, Chapter 14 identifies programme areas such as education initiatives, economic incentives, technological development, resource management and environmental protection, to advance sustainable agriculture and rural development (SARD) objectives - the goals of which are to enhance food security, meet the growing demand for food, and increase the production of land already in use, while not encroaching upon land unsuitable for food production.

Land, drought and desertification

Much of the land in Africa is drylands - land which is characterised by its aridity and inadequate and variable rainfall. Land degradation damages soil structure and leads to the loss of soil nutrients through processes such as water or wind erosion, waterlogging, salinisation and soil compaction. The direct causes of land degradation are inappropriate land use - mainly unsustainable agricultural practices - overgrazing and deforestation, ultimately leading to a reduction in the productive capacity of the land.

Part of any effort to improve resource management and environmental protection in agriculture and rural development therefore must include land resource management initiatives. The basis of Agenda 21, Chapter 10 provides a holistic approach to land resource management, as it considers the land's soils, minerals, water and biota. By linking environmental protection and economic development, policymakers and stakeholders are able to utilise the land's resources in a more efficient manner, advancing the goals of sustainable development. These issues are all up for review at this year's CSD session.

Sink or swim: Eco-patent commons and the transfer of environmentally sustainable technologies

By Krishna Ravi Srinivas

Agenda 21 and multilateral environmental agreements, including the UN Framework Convention on Climate Change (UNFCCC), emphasise the need for transfer of Environmentally Sustainable Technologies (ESTS). Yet, progress on this front remains unsatisfactory. The importance of the private sector in the transfer of technology is increasingly coming to fore. An initiative to share environmental patents is one example of how private sector entities are seeking to contribute to the wider dissemination of environmental technologies.

In the case of climate change, the need is two-fold - first, there is a need to develop technologies to mitigate climate change, and second, their effective transfer and deployment must be ensured. Although the UNFCCC process has produced some initiatives on technology transfer, the only significant progress to date entails the development of technology assessments and the creation of a clearing house mechanism. The sluggish pace of progress does not equate a total absence of technology transfer or development of technologies that can play an important role in mitigating climate change, however. In fact, a great deal of development and transfer has been facilitated through bilateral means and from the private sector to the private as well as public sector in developing countries. The importance of the private sector in the development, transfer and deployment of ESTS is now well recognised.

The Eco-Patent Commons - a new initiative

In response, the World Business Council for Sustainable Development (WBCSD) initiated the Eco-Patent Commons. This project enables open access to selected patents and permits for the creation of new ESTS products.² The Eco-Patent Commons is similar to a scheme in Open Source Software known as Patent Commons.³ Patent Commons is a collaborative effort by companies who together created a database of patents for use by the Open Source Community. Although ownership rights of the patents are not waived, developers are free to access and use patents in the pool for developing Open Source Software. Eco-Patent Commons operate in a similar way. Without waiving rights of ownership, the patent holder ensures that as long as their patent is used for the specified purposes – that is, the development of technologies or innovations related to environmental protection – there will be no suits for infringement. Even the commercial use of these patents will be permitted in some instances.

The structure of Eco-Patent Commons is uncomplicated: companies join by placing at least one patent into the commons database, which they continue to maintain, paying fees on the patent as necessary. Eco-Patent Commons is non-profit and voluntary.

While Eco-Patent Commons and Patent Commons are comparable, there are important differences between the two. Foremost, the Eco-Patent Commons focuses on advancing ESTS and developing tools for environmental protection. Also, with Patent Commons there are four types of commitments: commitments identifying specific patents; commitments that do not identify specific patents; commitments covering open source licensed software; and commitments covering specific standards or technology. Under Eco-Patent Commons the commitment is a simple one.

Current eco-patents

To date, there are thirty-one patents available under Eco-Patent Commons. These have been assigned by IBM – which has contributed the maximum – Sony, Nokia and Pitney Bowes. The patent assigned by Nokia – an invention called “Systems and methods for recycling of cell phones at the end of life” – is a good example of an Eco-Patent. This patent makes it possible to recycle certain components of mobile phones into other useful devices, thereby preventing a generation of e-waste and promoting the re-use of materials. However, unless the patent is applied in many countries it is difficult to assess its total environmental impact.

Also, while the patents available under Eco-Patent Commons represent a starting point, they have a very limited application in the further development of technologies in key sectors. Open Source software has had great success and the involvement of companies like IBM that support Patent Commons has furthered its cause. But in case of Eco-Patent Commons the absence of an “IBM” in the energy, environment or transport sector is a major drawback. While IBM supports Eco-Patent Commons, it is not an influential player in the energy or transportation sectors – key industries for advancing ESTS. Even if IBM increases its patents to Eco-Patent Commons, that may serve a limited purpose only. Until companies from the relevant key industries join the database—as they have with Open Source Software—Eco-Patent Commons cannot make a sizeable contribution towards the advancement of ESTS.

There are additional difficulties Eco-Patent Commons must overcome. Commonly, a technological invention is covered by many patents not necessarily held by a single entity. Technology is shared through licensing agreements or patent pools as is true of Patent Commons. Open Source Software, for instance, is mostly a collective endeavor where companies come together to create, test and make available the software. In the case of ESTS there is no need for such pools or for the availability of more technologies under a Commons – the objective here is to transfer the technology. And under Eco-Patent Commons the linkage between the inventions assigned is not clear. Mere availability of one or two patents in a technology will not facilitate the transfer of ESTS. The commercial value or significance of these patents first has to be assessed. But commercialisation involves training, learning to adopt and make efficient use of the technology. Therefore, while the availability of patents is necessary, it is not sufficient: access alone will not result in meaningful technology transfers or the optimum use of patents. There is thus a need to enable access to patents, but as part of a broader strategy of transfer of ESTS.

Need for further improvement

Although the aims of the Eco-Patent Commons are laudable, it needs to go a long distance before it meets its ambitious objectives. The number of participants that assign the patents must increase, as should the diversity of sectors. The patents assigned must meet a variety of needs in energy and resources consumption. The patents should also be accessible as a package. For example, a package of patents on technologies that are useful in energy conservation should be offered, as opposed to single entity inventions. The WBCSD should encourage the formation of patent pools that cover specific technologies and that are available for free use and for licensing. Transfer of these technologies should be facilitated by the WBCSD as well.

Given that the Eco-Patent Commons is only a few months old, it is too early to assess its impact. Information on the number of users, or the products and innovations developed using these patents is not yet available, which adds to the difficulty of measuring its effectiveness. While its objective are commendable and the initiative is worth expanding, the question of whether it will facilitate the development of technology and its transfer remains unknown.

If WBCSD can involve more players and make this a truly global initiative that offers much more than patents for free use, it will play a meaningful role in the transfer of ESTS and in furthering innovations that will help achieve sustainable development objectives.

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Endnotes

¹ See generally D.Kline et.al Clean energy technology transfer: A review of programs under the UNFCCC *Mitigation and Adaptation Strategies for Global Change* Volume 9, Number 1 / March, 2004

² For details see www.wbcd.org/web/epc/

³ <http://www.patentcommons.org/>

⁴ This article was written in the personal capacity of the author

Climate change update: Technology, IP issues on the table

Climate change negotiators have started grappling with key issues in order to arrive at a new global climate agreement at the end of 2009. Meeting in Bangkok, Thailand, in early April more than a thousand negotiators and other participants gathered to agree on the concrete work programme for the next two years.

During five intensive days of meetings, negotiators considered what roles different countries could play, and what responsibilities they could be expected to take on.

IP issues divide delegates

In the context of technology transfer and diffusion, intellectual property issues have become a controversial topic. One of the keys to successfully mitigating climate change will be the rapid global diffusion of climate-friendly technology - be it energy efficient technologies, or new and renewable energy generation technologies.

During the Bangkok negotiations, some developing countries, such as India and Pakistan, called for a relaxation of IP standards for all climate-related technology in order to support their rapid diffusion. Saudi Arabia went further, suggesting that countries should be able to issue compulsory licenses for climate change technologies - meaning they would be able to unilaterally make decisions to allow their companies to copy technologies without following normal procedures for patented goods.

Other countries were sceptical with regard to such an approach. Some, such as the US, noted that IP has not been the bottleneck or a barrier to the diffusion of climate technologies. China, a significant importer of environmental technologies, but also a rapidly growing producer and exporter, called for a balanced approach, saying the technology transfer discussion should not be allowed to get stuck on the single issue of IP.

Background

Intellectual property rights have long been a tool to promote innovation and the dissemination of new ideas and inventions. Nevertheless, in some cases the excessive scope or level of protection of intellectual property rights in fact provides a disincentive for further research and development, as well as an obstacle to access to the protected knowledge by the broader public. Therefore, a balance will need to be achieved between patents and access to climate-related technologies.

Intellectual property is not necessarily the bottleneck for the present generation of technologies. This may change as new technologies are developed, and a better understanding is also needed on a sector by sector and technology by technology basis. Under the Montreal Protocol, the technology funds included money to pay for the necessary licensing fees.

There is increasing realisation that - both within and beyond the intellectual property system - existing innovation structures and activities can and should be enhanced to benefit climate mitigation efforts. Initiatives include an international "distributed innovation" model and strategy for climate technology. Prizes to promote innovation in clean technologies are also being explored.

From export processing zones to low carbon development zones

By Bernice Lee and Nick Mabey

Twenty years ago, China successfully created a number of 'Special Economic Zones,' which helped jump-start its high-growth, export-oriented economy. Today, the world has changed and climate change is one of our most pressing challenges. While China has outgrown the need for Special Economic Zones to fuel its economy, this innovative concept can be tweaked and put to new uses. Together, China and the EU are spear-heading the concept of 'Low Carbon Development Zones,' which will be used to test and scale up the building blocks of the new, efficient low-carbon economy.

China and the European Union (EU) together account for 30 percent of global energy consumption and 30 percent of global greenhouse gas emissions. Their common interests provide a foundation for deepening collaborative efforts on energy and climate security over the next quarter-century. The combined might of the EU, the world's largest single market, and China, the fastest-growing major economy, can generate benefits of scale that will lower the costs of climate friendly goods and services globally. By working together, China and Europe could become the de facto engine of global low carbon transformation.

While the imperative for a sustainable energy future is clear, the transition is unlikely to be linear. Many policymakers and businesses remain thwarted by the immediate costs of economic adjustment, despite the potential of lucrative new opportunities powered by this transition. At a technical level, innovative products and services need time to be developed and refined prior to adoption and diffusion. Key technologies and practices may come to commercial maturation at different times, making it difficult for policymakers and businesses to commit to long term investments. Even though there are already pilot projects and facilities – and even cities to demonstrate specific or sets of technologies across the world – the scale effects of large-scale adoption of these new methods of production and consumption remain unknown.

In the early 1980s, the Chinese government embarked on an extraordinary journey towards greater economic openness. Special Economic Zones (SEZ) - geographical regions with more liberal economic laws than the rest of the country - were first established in Guangdong, Fujian, and Hainan provinces, most famously in Shenzhen. These were later expanded to larger geographical areas, paving the way for the two decades of spectacular economic growth. In general, 'SEZ' covers a broad range of more specific zone types, including Free Trade Zones, Export Processing Zones, Free Zones, Industrial Estates, Free Ports, Urban Enterprise Zones and others.

Following the successes of the SEZs, policymakers may wish to consider establishing 'low carbon development zones' (LCZ) in China. Just as the SEZs functioned as laboratories for liberal economic practices, these LCZs could become testing grounds for the large scale economic transformation required for a low carbon future.

Low Carbon Development Zones (LCZs) at the provincial or prefecture level could pioneer at scale the demonstration of the transition to efficient, low carbon economies at different level of economic well-being. The key to the zones' success would be clear and active regional political leadership, endorsed at the national level, to set the regulatory and public investment framework to facilitate, support and accelerate transformative private investment.

Initially two zones could be established, one in rapidly growing Eastern China and one in developing Western China to test the different environmental and industrial conditions and requirements. These zones could become the seeding ground for mainstreaming energy and carbon accountancy into all aspects of economic life within the zones, facilitating cross fertilisation of ideas and practices. They could also demonstrate to other regions and countries the viability of the low carbon economy.

The benefits of establishing LCZs are foreseen to be manifold. First, like the SEZs, they would provide a focus for attracting qualitatively different foreign investments away from low value addition and simple processing and assembly of manufacturing goods towards research and development, high-end design, modern logistics and other new areas. This is consistent with the vision of science-based development set out by the Chinese leaders in the 17th Party Congress held in October 2007. This could apply to light or heavy industries as well as small and larger scale energy production.

Second, in addition to acting as testing grounds for new products, services and infrastructure, LCZs could become areas in which low carbon technologies would thrive.

The scale impact could enable previously small scale deployment to be scaled up, demonstrating their economic and environmental viability. This could also strengthen exports of key technologies and practices.

Third, these LCZs could become focal points for international cooperation, for example through carbon finance (emission trading and the Clean Development Mechanism), concessionary loans or aid efforts from public entities like regional development banks or critical international partners such as the EU. Today, member states of the European Union have diverse cooperation programmes with China, which are often ill-coordinated. These investments often fail to have a transformative impact on the necessary scale to influence the pathway of China's development. To improve the impact of bilateral cooperation, European countries could agree to focus their assistance and cooperation on energy and climate change issues in these zones, so as to provide scale impacts and reduce transaction costs, and in particular to promote exchange of know-how and professional services in critical areas.

Fourth, these LCZs could enable experimentation for creating an enabling regulatory environment and progressive governance framework towards the development of low carbon economies.

Fifth, these LCZs could serve as centres of excellence on climate change impacts and adaptation, where expertise on climate change impacts and understanding of the necessary technologies needed to adapt could be brought together and translated into joint ventures and policy solutions in order to boost China's adaptive capacity.

More specific undertakings within these LCZs could include:

- The large scale development, demonstration and manufacturing of state of the art energy efficient and low carbon goods and services;
- Widespread construction of new low or zero carbon towns and infrastructure;
- Application of alternative transport modes over large areas and encompassing urban and rural requirements;
- Energy efficient production methods for heavy industries;
- Testing of the necessary adaptation to climatic changes; and
- Serving the role of incubator for new technology companies, joint ventures and innovative practices.

Some preliminary policy options for these low carbon economic zones could include:

- A clear regulatory structure aligned with the best international standards and regulations for driving the transition to efficient, low carbon economies for regions at different levels of development.
- Incentives to encourage the right kind of foreign investment through financing incentives, including those that will enable the 'bundling' of financing for SMEs from larger financial institutions.
- Incentives to promote and support inward investment in low carbon products and services, including research and development.
- Facilitating higher value-added trade through removing barriers to trade in low carbon goods and services such as zero tariffs for low carbon goods and/or low carbon services trade liberalisation.
- Joint research and development programmes based on centres of excellence on low carbon technologies, supported by public and private investment.
- Public investments in large scale demonstration of commercial technologies in return for licensing of key technologies for diffusion.

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UPCOMING EVENTS

MAY

- 5-16 UNITED NATIONS COMMISSION ON SUSTAINABLE DEVELOPMENT (CSD-16). New York, United States. <http://www.un.org/esa/sustdev/csd/review.htm>
- 12 FOOD, FUEL AND FORESTS: A SEMINAR ON CLIMATE CHANGE, AGRICULTURE AND TRADE. Bagor, Indonesia. <http://www.agritrade.org>
- 12-16 4TH MEETING OF THE CONFERENCE OF THE PARTIES SERVING AS THE MEETING OF THE PARTIES TO THE CARTAGENA PROTOCOL ON BIOSAFETY (COP-MOP 4). Bonn, Germany. <http://www.cbd.int/mop4/>
- 12-16 PLANT DIVERSITY - WORLD CONGRESS ON THE FUTURE OF FOOD AND AGRICULTURE. Bonn, Germany. <http://www.planet-diversity.org/registration.html>
- 19-30 NINTH MEETING OF THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY (COP-9). Bonn, Germany. <http://www.cbd.int/cop9/>
- 30-31 GLOBAL DIALOGUE AMONG STAKEHOLDERS: THE FUTURE OF AGRICULTURE. Barcelona, Spain. <http://www.ictsd.org/dlogue/2008-05-30/2008-05-30-desc.htm>

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- 2-6 16TH EUROPEAN BIOMASS CONFERENCE AND EXHIBITION: FROM RESEARCH TO INDUSTRY AND MARKETS. Feria Valencia, Spain. <http://www.conference-biomass.com/index.htm>
- 2-13 28TH SESSIONS OF THE UNFCCC SUBSIDIARY BODIES. Bonn, Germany. http://unfccc.int/meetings/unfccc_calendar/items/2655.php?year=2008
- 3-5 HIGH-LEVEL CONFERENCE ON WORLD FOOD SECURITY: THE CHALLENGES OF CLIMATE CHANGE AND BIOENERGY. Rome, Italy. <http://www.fao.org/foodclimate/conference.html>
- 3-6 IWA REGIONAL CONFERENCE: MEMBRANE TECHNOLOGIES IN WATER AND WASTE TREATMENT. Moscow, Russia. http://2008.sibico.com/?content=list§ion_id=31
- 4-6 CARBON FINANCE NORTH AMERICA 2008. New York, USA. <http://www.environmental-finance.com/conferences/2008/CFNA08/programme.htm>
- 5 WORLD ENVIRONMENT DAY: KICK THE HABIT! TOWARDS A LOW CARBON ECONOMY. Wellington, New Zealand. <http://www.unep.org/wed/2008/english/>
- 7-11 12TH SESSION OF THE INDIAN OCEAN TUNA COMMISSION. Muscat, Oman. <http://www.iotc.org/>
- 16-18 LOW AND ZERO CARBON HOUSING: RETROFITTING AND NEW BUILDING DESIGN. Forres, Scotland. <http://www.cifalfindhorn.org/>
- 20-23 PLANNING FOR CLIMATE CHANGE: WEATHERING UNCERTAINTY SYMPOSIUM. Iqaluit, Canada. www.planningforclimatechange.ca
- 22-25 ASIAN WETLAND SYMPOSIUM 2008. Hanoi, Vietnam. <http://www.aws2008.net>
- 23-27 9TH MEETING OF THE CONFERENCE OF THE PARTIES (COP) TO THE BASEL CONVENTION. Bali, Indonesia. <http://www.basel.int/meetings/meetings.html>
- 25-28 INTERNATIONAL CONFERENCE ON GROUNDWATER AND CLIMATE IN AFRICA. Kampala, Uganda. <http://www.gwclim.org/>

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