Biofuels

They could just be the biggest direct threat that African nature has ever faced

by **Adam Welz**

YOU MAY have noticed, if you read the papers, that biofuels have merited quite a lot of ink lately. The government, as part of its much-touted Accelerated and Shared Growth Initiative for South Africa (AsgiSA), is pushing the development of a biofuels industry hard, primarily to create jobs and uplift the 'second economy'. They say that other benefits of developing homegrown biofuels are environmental (we'll reduce our greenhouse gas emissions) and financial (we'll keep money inside our own economy by not spending it on oil imports).

Since biofuel production plants are expensive to build and biofuel crop feedstocks also relatively pricey compared to crude oil, the industry will require substantial support from the state in the form of tax breaks and subsidies to develop. In order to define the correct levels of such support and evaluate the pros and cons of a biofuels industry as a whole, government commissioned a National Biofuels Study. A careful reading of this 116-page document reveals glaring omissions, totally inadequate referencing, and a bias towards environmentally-damaging production techniques.

We should be very concerned if government takes the recommendations of the Study to heart and embarks on creating the kind of biofuels industry it envisages.

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Land hungry crops

The first major issue of concern is that the crops punted by the Study for the production of bio-ethanol, maize and sugar cane, are extremely land-hungry. To avoid too much food-producing land being taken over by biofuel crops, the Study talks of expanding maize production into what it calls 'under-utilized land' – in other words, unploughed land that has the potential to grow crops. (Much of the still-unploughed land suitable for maize is in the grassland biome, already hit hard by agriculture and urban development.) For the sake of efficiency, it recommends that biofuel crops be planted densely around the factory, which means that 'a typical 100 million-litre-per-annum plant would force a certain land use on 100 000 hectares (about 40 x 40 km land)'.

The Study reckons that the industry could grow to about fifty biofuel plants that would be able to supply 50% of South Africa's liquid fuel requirements. This means that about five million hectares of arable land would be dedicated solely to biofuel crops; two million hectares of 'existing farmland' and three million of 'under-utilized land' (i.e. land that currently supports wild species). The Kruger National Park covers almost two million hectares. The image of one-and-a-half Kruger Park's worth of grazing- and wild-lands being churned up into chemical-soaked monoculture should keep anyone who cares about our plants and animals awake at night!

Of course, the Study only talks about South Africa. Nearby countries such as Mozambique, Zambia and Angola have far greater biofuel crop potential with their higher rainfall and richer soils – investors are already contemplating turning tens of millions of hectares of those countries into rows of mielies, sugar cane, or whatever. Without wanting to sound hysterical, it must be said that this might be the biggest direct threat that African nature has ever faced. According to the Study, a single 4x4 consumes as much maize as twenty-five people, therefore the demand for biofuels is virtually limitless. Biofuel crops could use far more land than food crops in future.

Not waterwise

Then there is the issue of water. If biofuel crops are to be irrigated, that means more stress on our already-beleaguered freshwater ecosystems (73% of South Africa's main river ecosystem types are classified Endangered, versus only 18% of terrestrial types). Even if they are not irrigated, silt, fertilizer and pesticide run-off from crop fields can have a devastating effect on water quality and river systems. Ploughed fields aren't nearly as effective at absorbing floodwater as natural grasslands.

Invasive potential

Biofuel crops also have potential to be invasive. *Jatropha curcas* is a deciduous succulent (Euphorbiaceae), probably originally native to Central America but now naturalised around the world. It has many medicinal uses, but the oil from its seeds is used to produce bio-diesel. Some invasive species experts think it may become weedy in southern Africa given the ideal climate for it here and the fact that its close relative, *Jatropha gossypifolia,* is a major weed in Australia. If *Jatropha* plantations are abandoned following failed bio-diesel development initiatives they could be ideal sources of propagules in the landscape, forming a secure beachhead from which to invade surrounding ecosystems. Such fears may already be being realized – the newspaper *Rapport* recently carried a story on the demise of a bio-diesel project near Mafikeng due to a financial argument between the North West provincial government and a private investor. Many *Jatropha* plants have now been left untended there.

Ozone unfriendly

The climate advantages of many biofuels are also not what they seem. At first glance it seems logical that burning biofuels should be better than burning fossil fuels – after all, burning a plant releases carbon dioxide that was taken from the atmosphere by that plant while it was growing, while burning fossil fuels adds appreciably to the total carbon in the atmosphere by releasing carbon that has been safely locked underground for millions of years. However, ploughing natural habitat releases a lot of carbon that has been stored in wild plants (both above and below ground) and in the soil. Crops, particularly annual crops like maize, cannot store nearly as much carbon as natural grasslands or savannas.

It also takes an enormous amount of fossil energy to grow

crops in the conventional way – diesel for tractors, coal to run bio-diesel factories, fossil energy used in fertilizer manufacture, and so on. Many experts have pointed out that certain biofuel crops such as maize and oil palm actually contribute massively to climate change rather than helping to ameliorate it, particularly when natural habitats are destroyed for crop planting.

Are there ways to develop a biofuels industry that helps rather than hurts the environment?

Actually, there might be. Bio-gas digesters, which compost biomass such as cow manure or plant material, can supply households with high-quality cooking and heating gas while at the same time producing rich plant fertilizer (cow manure that is broken down in a digester rather than 'naturally' in the veld retains a lot more nitrogen). De Beers Fuel Ltd is developing biofuels based on algae – the company claims that one hectare of algae can produce 92 000 litres of bio-diesel per year versus only 350 litres per hectare per year from sunflower seeds, a common bio-diesel feedstock. New ways of deriving ethanol from the cellulose in plant cell walls by breaking it down into sugars (cellulolysis) are already being developed. This allows almost any plant material such as crop waste or natural grass to be used as a biofuel feedstock, not just sugar- and starch-rich parts of the plant.

Interestingly, the current biofuels industrial development strategy has almost no environmental safeguards and even calls for 'streamlining' of the current EIA process. It also seems to benefit the industry distributors and blenders more than farmers. This might be because it was written by insiders for the advantage of current investors and corporations. Monsanto is concluding a deal with the Eastern Cape Development Corporation to plant about 500 000 hectares of that province with genetically-modified canola for bio-diesel – over a billion rand of taxpayers' money is likely to be used to prepare and fence the fields. Sasol produces ethanol as a co-product of its oil-from-coal process. The price support proposed by the government for ethanol (which is chemically identical to Sasol's 'non-bio' ethanol) might allow that company to raise the price it currently receives on the open market.

BotSoc members should prepare themselves to oppose bad biofuels policies that might be imposed by government, and strongly make the case that there are far better ways of developing a truly environmentally- and socially-advantageous industry than the ones officially proposed thus far.

You can access the BotSoc Conservation Unit's comments on the Biofuels Strategy on the BotSoc website, or from the CU. See contact addresses on page 63.

Biofuels jargon-buster

Biofuels Fuels made from biomass, i.e. recently living organisms or their metabolic by-products (e.g. cow manure). The main liquid biofuels are bio-ethanol and bio-diesel.

Bio-ethanol Ethanol (the kind of alcohol in alcoholic drinks) made from biological sources, often sugarcane or maize. It's usually blended with petrol at various ratios for use in motor vehicles.

Bio-diesel Diesel made from recently-living stuff, usually oily plants like canola (rapeseed) or *Jatropha*. It can be freely interchanged and blended with normal (fossil) diesel.

Energy balance Describes the ratio of energy produced by 1 kg of a given fuel to the energy needed to produce it. For example, bio-ethanol produced from sugar cane typically has an energy balance of 1:6 - when burned, it produces six units of energy for every one that was used in its cultivation and refinement.

Carbon balance The ratio of carbon absorbed from the atmosphere during the growth of biofuel crops to the carbon released into the atmosphere during the growth, manufacture and use of the biofuels made from those crops. Not to be confused with energy balance, carbon balance tells us how much given crops might contribute to global warming. For maize, the contribution to combating climate change is negligible or even negative.

TOP: South African agriculture is a gamble. This is the heart of our richest maize growing area, photographed on 23 March when it should have been tall, green and full. Relying on maize biofuel for our transport seems risky, especially given climate change. The biofuel strategy deliberately ignored the impacts of climate change.

ABOVE: If biofuel crops are to be irrigated, that means more stress on our already-beleaguered freshwater ecosystems.