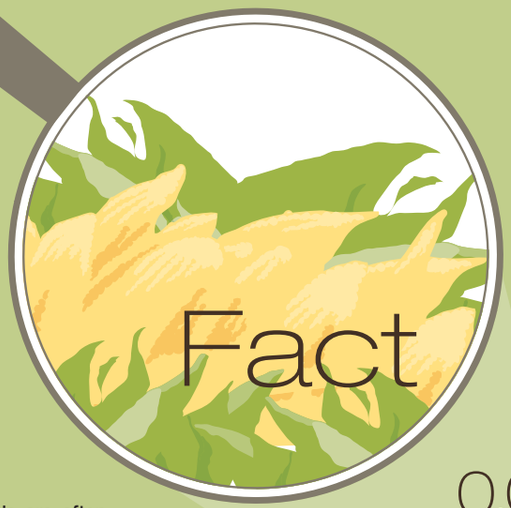
Myths and Facts about Bioenergy in Africa

pangea



Biofuels are often accused of creating food insecurity in Sub-Saharan Africa because of perceived competition for land with food crops. The assumption is that biofuel production is directly linked to increasing food prices, yet biofuel production in Africa is still very small, accounting for less than 0,05% of global biofuel production[1].

0,05% of global biofuels are produced in Africa

Africa is home to up to 60% of the world's underutilised land[2,3,4]. About 45% of that available land is deemed suitable for agriculture[5], while three-quarters of existing farmland is heavily depleted because continuous farming has not been offset by an appropriate replenishment of nutrients[6].

The land use challenge can be partly solved with the Integrated Food-Energy Systems (IFES), by simultaneously producing food and energy. Farming methods combining the production of both food and energy will help rural communities solve two of their main problems—lack of energy access and food scarcity. There are keys to achieving IFES; firstly, multiple-cropping systems can be used in conjunction with nurturing livestock and/or fish. Secondly, using agro-industrial technology to produce renewable energy can integrate the processes by using all of the by-products and feeding them back into the system, creating higher crop yields. Anaerobic digestion is an example of these technologies.[7]

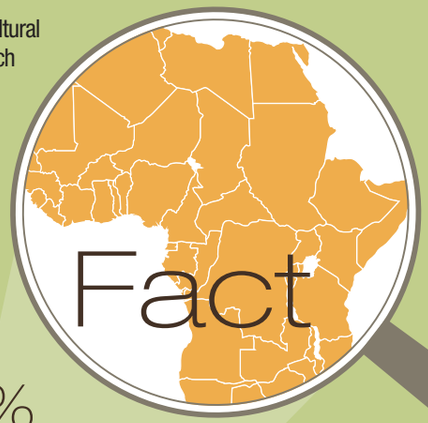
Let us not forget energy is needed to produce food, and investment in bioenergy can leverage investment and infrastructure to produce more food—not less. In Africa many other factors have a much more significant influence on food production and prices, such as lack of food storage[8], post-harvest losses[9], climatic extremes[10] and national policies[11].

Myth

Biofuels shouldn't be produced in Sub-Saharan Africa because they cause food insecurity

First generation biofuels are produced on agricultural land, but the demand for food remains, which could lead to the displacement of food production elsewhere, creating an Indirect Land Use Change (ILUC). ILUC differs from Direct Land Use Change because it refers to changes that occur to land not utilised by the causal activity.

Most developed and emerging economies participate in global commodity trade, linking supply with demand while in regions such as Europe and the United States, most of the available arable land is already utilised. It is this relationship that potentially leads to ILUC, and we therefore support the valuable research that is being undertaken to model it. Those models are still at an early stage, however, and though they provide insights for policymakers, the results are not such that fixed ILUC emissions factors can be assigned to biofuels at this stage.



Only 12% of arable land is under production in Mozambique, Tanzania and Zambia

Looking at the example of Africa, ILUC linked to biofuels production appears unlikely because their economies are relatively disconnected from global commodities trade[12]. In addition, considering that less than 0.05% of global biofuels are produced on the continent, there is land available for both food and fuel production. In Mozambique, Tanzania and Zambia only 12% of arable land is currently under production[13].

Despite ILUC modelling being at an early stage and the lack of convincing evidence linking ILUC and biofuels in Africa, there are still some measures that can be taken to mitigate potential ILUC impact that should be incentivised by policies. Those measures include the use of co-products, improving crop yield, increasing manufacturing efficiencies, increased crop production on degraded or abandoned land, and producing biofuels from waste and residues[14].

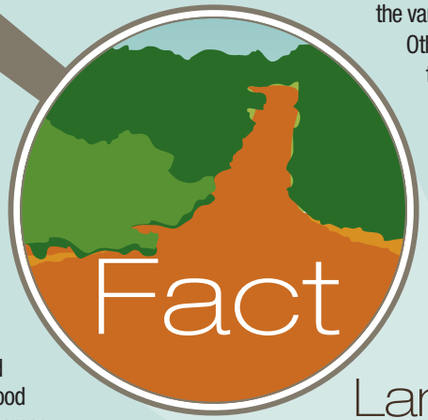
The European Commission has recently proposed to end subsidies for first generation biofuels after 2020 partly due to the ILUC issue[15], which sends the wrong signal to the bioenergy industry in Africa, where there is a great amount of underused land[16] that could be mobilised for energy production. There are less drastic approaches to avoiding ILUC than those proposed that could be more effective. One such proposal is the Low Indirect Impact Biofuels (LIIB) methodology,[17] which is a certification scheme developed to demonstrate when production of biofuels from a farm system has not lead to ILUC.

The world is full of under-utilised land that can grow the biomass that bioenergy demand will require. According to the Food and Agriculture Organisation, the world has a bit less than 1,4 billion hectares of arable land[18]. The FAO says the world has 610 million hectares of "moderately suitable" unforested marginal lands. It also says that another estimate gives the total global area of degraded land, defined as formerly forested tropical lands not currently used for agriculture or other purposes, as 500 million hectares (100 million each in Asia and South America and 300 million in Africa). Current abandoned agricultural land could be 386 million hectares globally.[19]

The countries that have the largest endowment of underutilised lands are in the developing world, especially Africa and Latin America. Putting that land into production will require a type of infrastructure that – as opposed to the dedicated variety required by extractive industries – usually encourages complimentary forms of investment by lowering transport costs in more remote regions of the country, and opening them up for more development. Bioenergy will make those infrastructure investments socially profitable, creating a possible stepping-stone for other industries to develop alongside[20].

Myth

Land use change impacts offset the GHG benefits from all biofuels



Land grabbing, or the large-scale acquisition of farmland in developing countries, has caused global concern for the rights of small-scale producers at risk of losing their land at the hands of unscrupulous investors and governments. Worldwide food security issues and an increasing demand for biomass as an energy source have resulted in heightened demand for fertile land. In Sub-Saharan Africa, large-scale land deals are particularly controversial as land in this region is central to livelihoods and to identity.

In 2009, global land deals were estimated to total almost 60 million hectares[21]. Mozambique, Liberia, Ethiopia, and South Sudan have all agreed major land deals with foreign investors[22]. A more recent report has outlined proposals for the use of 500.000 hectares of land in Kenya and Angola for biofuel production, while in Tanzania rice farmers have been driven off their land in favour of a sugarcane plantation[23].

PANGEA argues that land grabbing is not a result of demand for land to produce biofuels but instead is due to weak land tenure in African countries, stemming either from a lack of land policy or a lack of implementation of policy, that allows unscrupulous companies and government officials to take away land rights from otherwise helpless farmers.

Reports from Oxfam, ActionAid and others all use a similar quote on land grabs: that 60% or two-thirds of land grabs are for biofuels. These quotes come from the International Land Coalition (ILC) report "Land Rights and the Rush for Land" from January 2012. But much like PANGEA's report on land grabbing[24] released in November 2011, the ILC found verifiable data regarding land deals to be exceptionally difficult to find.

Even though the ILC report isn't yet able to provide cross-referenced and ground-truthed data, it is a starting point that gives an indication of where trends may be going. Yet there is a real lack of clarity when looking at the various projects reported in the database. Other than jatropha, which is fairly clear that its use is for biofuel, it's virtually impossible to know what the end market of that agricultural land will be for. Will the palm oil be for biodiesel or for food? Will the sugarcane be just for ethanol or for sugar as well? What about the maize or soy? These multi-use crops cloud the issue, making it easy for one to assume that the end use is biofuel but without having any certainty if that is the case.

Land grabbing is not a result of demand for land to produce biofuels but instead is due to weak land tenure in african countries

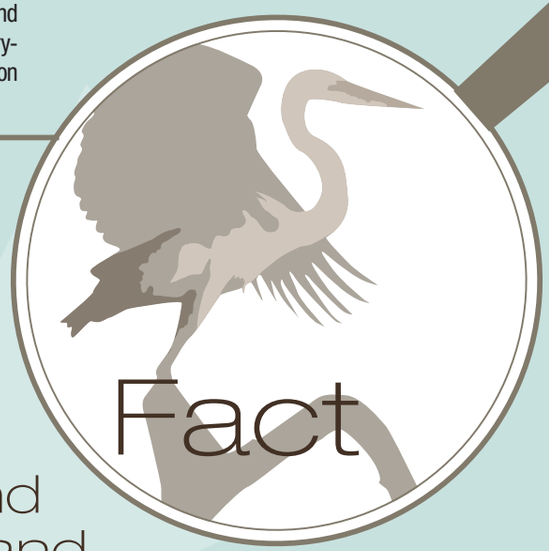
When PANGEA questioned the ILC's programme manager in January 2012 regarding their data in hopes of finding a verified source for further research, he confirmed the quantitative data was based on figures from the extensive database ILC had been constructing. He said the information for the database was obtained through media reports and that the media reports were cross-referenced with reliable data sources such as studies carried out by contracted partners/trusted members and/or research projects whereby someone was sent into the field.

He emphasised the importance of the difference between reported land deals and cross-referenced land deals and explained that it is indeed very hard to verify data.

He said that in the report they were very careful not to describe any of their data as verified, yet anti-biofuel advocates have failed to state this fact when pointing at the ILC study as the truth about biofuels. He said it is difficult to verify data because even with the information obtained from reliable sources, one must expect that things can change.

He agreed that biofuels projects receive far more media attention than the extractive industries do, hence it is entirely likely that the figures quoted for biofuel land grabs are inflated relative to those quoted for other industries. He did however qualify this by saying that with the land matrix project and the resulting database, they are trying to reduce the effects of the extensive media attention on biofuels and food security issues by studying the other types of land deals in depth and gradually they feel the database is being cleaned out.

PANGEA recognises that some land transactions inside and outside of the biofuels industry have likely taken place, but puts the onus on governments to strengthen their policies and implementation of those policies to ensure fair treatment of small-holders. At the same time, PANGEA insists that biofuel producers implement sustainable practices according to established, recognised sustainability programmes to ensure current and future projects provide the economic and development benefits they intend.



Agricultural production for biofuel is no different than agricultural production for food, feed or fibre, but it can be done better. Biofuel plantations will be less biodiverse than a natural habitat, but can be more so than with food crops. With biofuels and bioenergy in general, the same or better attention to respecting biodiversity must be adhered to. All biofuel sustainability schemes include protection of biodiversity as a main tenet of environmental sustainability for biofuels.

Inter-cropping and integrating food and energy production can also encourage biodiversity

For example, several energy crops are perennial and so can have higher biodiversity than annual food crops. A review of potential impacts of short rotation coppice (SRC) plantations in the UK showed that SRC has biodiversity benefits over arable crops in terms of species richness and abundance, for flora, and many types of fauna including birds, invertebrates and small mammals[25].

In Africa, examples of inter-cropping and integrating food and energy production can also encourage biodiversity, such as the Cleanstar Mozambique project that includes cassava production, vegetable production as well as fruit and oil tree production in each of its farmers' plots[26].

Farms and large crop areas can encourage some species while removing the habitats of others. This is a problem that is not unique to the biofuels industry and should be the responsibility of individual farmers and companies to carry out strategic planning and careful assessments of biodiversity, particularly for large projects. There is also a responsibility of civil society and governments to inform companies of the importance of maintaining and being considerate of biodiversity and ensure those measures are implemented[27].

Myth — Demand for biofuel causes 'land grabbing' in Sub-Saharan Africa

Myth — Biofuels plantations are bad for biodiversity

Soaring food prices, including two price spikes in 2008 and 2010[28], have put into question the use of food for biofuel feedstock. Some studies ascribe between approximately 20% and 75% of food price increases occurring from 2000 to 2008 to the worldwide demand for biofuels[29,30,31]. These figures, however, are based mainly on commodities traded on international exchanges. The price transmission from these exchanges to domestic markets depends on the level of integration with one another.

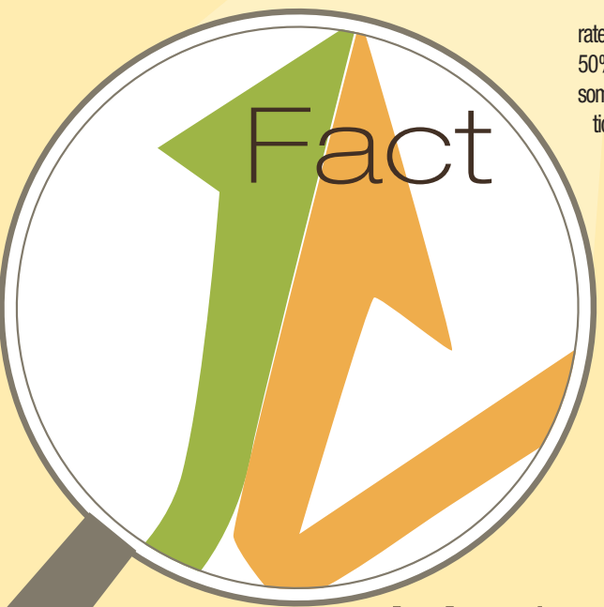
A study by PANGEA[32] shows the disconnect between international prices and local food prices in Sub-Saharan Africa. That lack of price transmission is key to understanding the real dynamics in the food and fuel competition debate so that true drivers in food prices can be analysed and addressed. Continually blaming biofuels unnecessarily, however, will only serve to spook the global investment community and keep true economic development from reaching the continent.

The price of food is increasingly tied to the cost of oil, as shown by the World Bank in 2011[33] and again in 2012[34]; while biofuels are not directly mentioned[35]. Statistics on this clear correlation are available from a number of sources and are easy to conduct yourself. Sub-Saharan Africa is a net importer of food and agricultural commodities. In 2010, an average of 10,46% of food traded in the region was imported[36]. The rising price of commodities, ranging from oil and steel to maize and wheat, are in many ways a reflection of increased demand from growing economies and an anticipation of robust economic recovery in the globally economy. Higher food prices may lead to trade imbalances to which Sub-Saharan African countries, most of which are low-income, may have difficulty in responding.

However, international trade restrictions are common in Sub-Saharan Africa, and in some cases are likely to block price transmission from international to local markets. Moreover, only certain food crops are imported from overseas, such as rice and wheat; many staple crops, e.g. maize, are produced locally or imported through cross-border trade[37].

The price of food is increasingly tied to oil, not biofuels

In Sub-Saharan Africa, many true drivers that contribute to price rises exist. The 21st Century has seen prices rise as global demand for food exceeds availability of supply and will continue to do so while populations continue to expand; compounding the problem by resulting in less land availability for crops. Combine that with limited water resources, high water prices, increasing non-food crop production, rising costs of energy and agricultural inputs, lack of infrastructure, and climate change/sustainability fears which affect the rate of deforestation for farming etc. Of course, the estimated 40-50%[38] of root crops, fruit and vegetables produced that are lost somewhere along the supply chain every year, all impede production and therefore result in sustained food price rises[39].

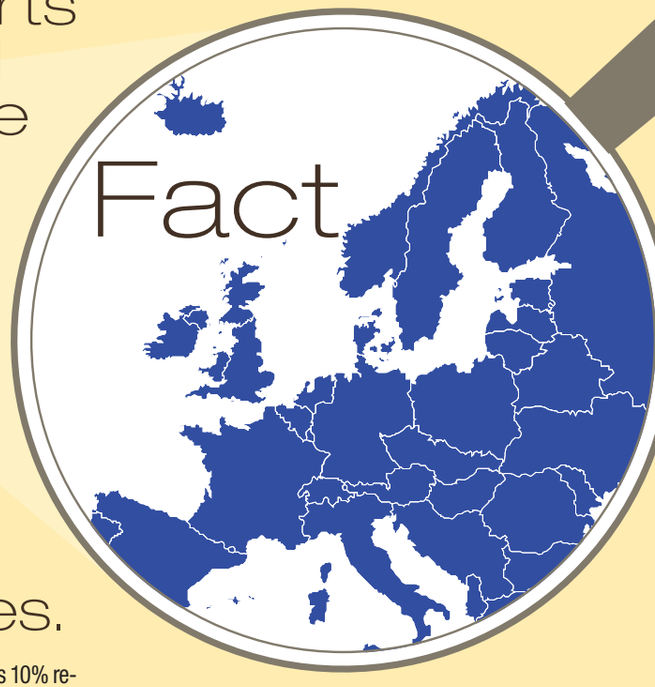


Biofuels should not be blamed for price increases in Sub-Saharan Africa; they should be promoted as opportunities to stabilise local agricultural production by offering additional markets in times of surplus, helping to avoid local prices from collapsing, while offering additional energy access and supporting local livestock industries with animal feed availability. Biofuels also have the potential to keep prices down by reducing producers' reliance on fossil fuels and exposure to international oil prices.

Myth

European and US biofuels policies drive higher food prices in Africa

African exports of denatured ethanol to the EU only reached 3.423 tonnes during 2009-2011, compared to Brazil's 138.209 tonnes.



The Renewable Energy Directive (RED) mandates 10% renewable energy use in transport fuels by 2020[40]. As electric vehicles are not yet commercially viable, achieving these targets is typically expected through liquid biofuels. The aim is to use only sustainable biofuels, demonstrating clear GHG savings without negative impacts on biodiversity and land use.

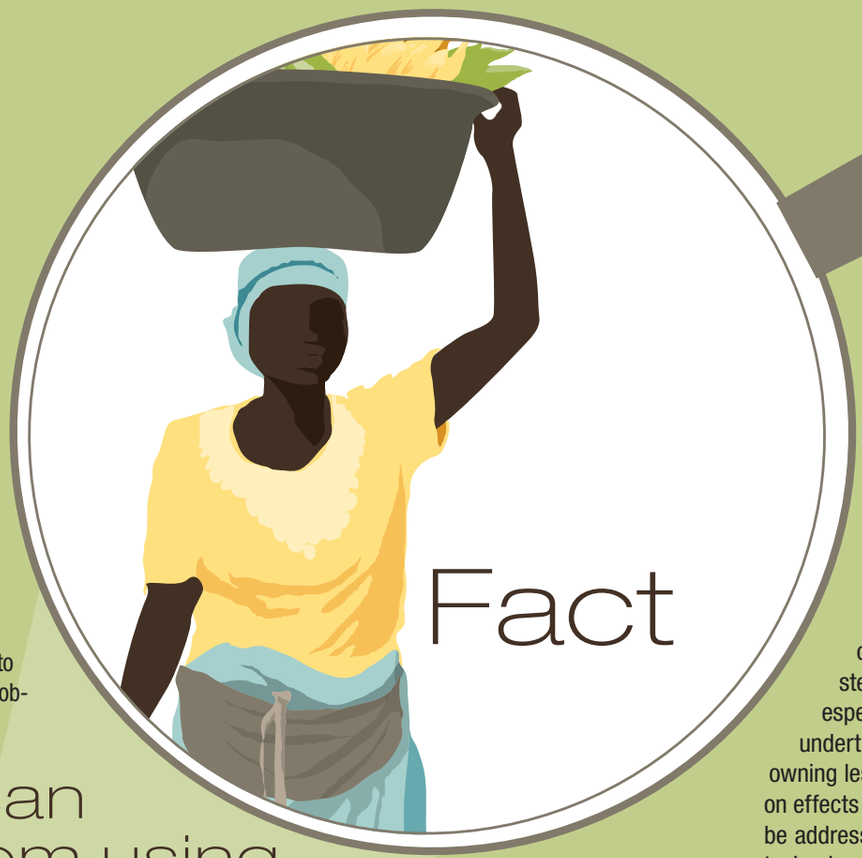
Some have alleged that a rapid increase in biofuels production in Africa is a result of economic drivers from the RED, which have led to negative consequences in African communities such as land grabbing. However, African biofuel production levels are very small relative to global production levels, at less than 0,05%[41] — from the statistics it is crystal clear that an incredibly low, even negligible, percentage comes from Africa. This is not to say that subsidies from EU member states have not played a role at all, as some companies have cited encouragement from European market demand in their reasons for investing in Africa. But the land rush to produce biofuels in Africa as portrayed by some is not held up by facts.

Indeed, the continent has an incredible amount of potential for sustainably produced biofuels. One such example is Addax Bioenergy in Sierra Leone, whose project was tailor made to comply with the RED's sustainability criteria as a showcase that such biofuels could be produced on a large-scale. The company spent more than US$2 million on studies and experts to define baseline data and analyse potential negative impacts while developing mitigation strategies, all before sugarcane was ever planted. It has also won awards recognising its innovative legal mechanisms that protects local communities at all stages of the process including land use and cane supply.

Subsidies from European member states promoting the use of biofuels in their domestic markets do not play a significant role in biofuel plantations in Africa. As of 2008, nearly all biofuel imports to the EU came from the USA, Brazil, Indonesia andv Malaysia. According to the Eurostat Database, African undenatured ethanol exports to the EU reached 83.645 metric tonnes between 2009 and 2011, compared to 219.643 tonnes from Brazil. Undenatured ethanol can be used for fuel but also for potable alcohol and the chemical industry. African exports of denatured ethanol, which is only used for fuel, only reached 3.423 tonnes during that period, compared to Brazil's 138.209 tonnes. By 2020 the total amount of biofuels imported from the rest of the world is projected to shrink from nearly 1,80 Mtoe to just over 0,60 Mtoe and be supplied wholly by Latin America and the Caribbean, particularly from Argentina, and Indonesia and Malaysia[42]. The role of Africa's exports to the EU is negligible in both cases and therefore shows at most a limited effect of EU subsidies on the development of biofuel plantations in Africa.

Myth

EU subsidies are driving development of biofuel plantations in Africa



Fact

In many African countries, the lack of energy in rural areas has severe negative impacts on women because they are those responsible for collecting and managing the traditional biomass necessary for household activities. In cities, the problem is more related to the very polluting charcoal and paraffin that women often use to cook with, creating serious health problems for them and their children.

Women can benefit from using by-products to boost their income and from increasing their energy supply

Sustainable biofuels can bring benefits to women in developing countries, both in the production phase and in the use phase.

In rural areas, women are often those most engaged in producing food crops. The production of crops for biofuels could give women access to higher income as well as access to fuel for electricity generation, cleaner cooking and to operate agricultural equipment. Women in developing countries have less access to income generation activities than men; biofuels present an option of more cash income in rural areas for them. Besides the economic benefits from the direct involvement in growing and processing biofuels crops, women can also benefit from using by-products of these crops and from increasing their energy supply[43]. This is the main point about biofuels production in Africa; it gives access to energy, for both electricity production and cooking activities, to communities that often lack sustainable energy. Energy access means development and the possibility to be involved in income generation activities.

Biofuel technologies at village-level will generate income for communities and allow women to reallocate time from finding fuel provisions. The issue of the labour – gender gap is one that stems from inequalities of land-ownership, especially in Africa. Cameroonian women undertake 75% of agricultural work, while owning less that 10% of land[44], which has knock-on effects for credit. If these underlying issues can be addressed then biofuels can be a very positive technology for women and for the environment.

According to a study from ENERGIA[45], in Ghana a women's group growing jatropha extracting the oil from the seeds and mixing it with diesel (70% plant oil with 30% diesel) are able to fuel shea butter processing equipment, and also use it as a kerosene substitute for use in lanterns. The project represents one of the first models for small-scale biofuel production linked to the empowerment of women, and efforts are being made to finance similar projects in other villages. The project is managed by GRATIS Foundation Ghana[46].

Biofuels can also be very positive when used by women for cooking. In Africa, more than 80% of Africa's 400 million[47] urban inhabitants use charcoal for household energy with all the consequences of indoor and outdoor pollution. Using biofuels reduces the need for time-intensive collecting of fuels and the negative impact on the ecosystem and environment. Overall the use of biofuels can be a community-championed alternative energy supply.

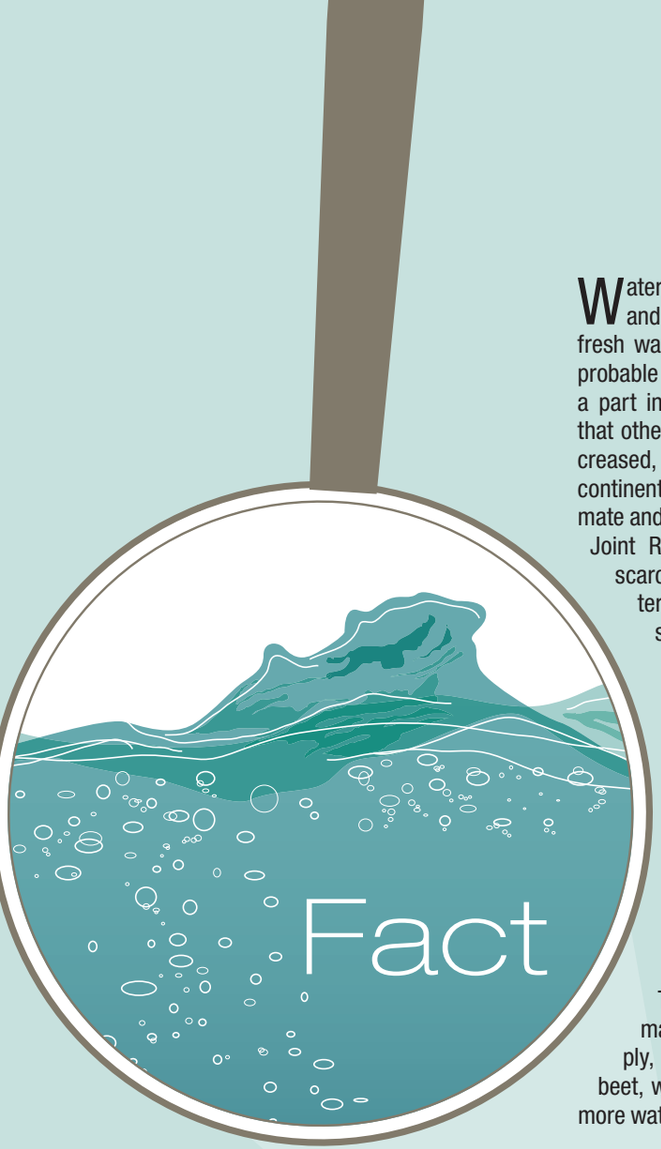
Research by the Institute of Health Metrics and Evaluation (IHME) found that there are an astonishing 3,5 million deaths per year directly attributable to household air pollution[48]. This is double the previous WHO estimates of 2008[49]. The report will contribute to the WHO update in 2013. The IHME research links smoke from solid fuels to many fatal diseases, in particular pneumonia and lung cancer[50].

Some figures from the Global Alliance for Clean Cookstoves show that each day nearly 3 billion people rely on solid fuels to cook, using traditional cookstoves or open fires in households with little or no ventilation. Exposure to smoke from these polluting forms of cooking kills 2 million people annually, with millions more suffering from cancer, pneumonia, heart and lung diseases, blindness and burns.[51].

Using ethanol for cooking, as an example, immediately improves air quality both inside and outside the home by reducing the smoke and carbon emissions[52], would improve health in both children and adults, and lower the burden on women to which these roles also fall more heavily than men.

Myth

Biofuels production in Africa increases gender inequality



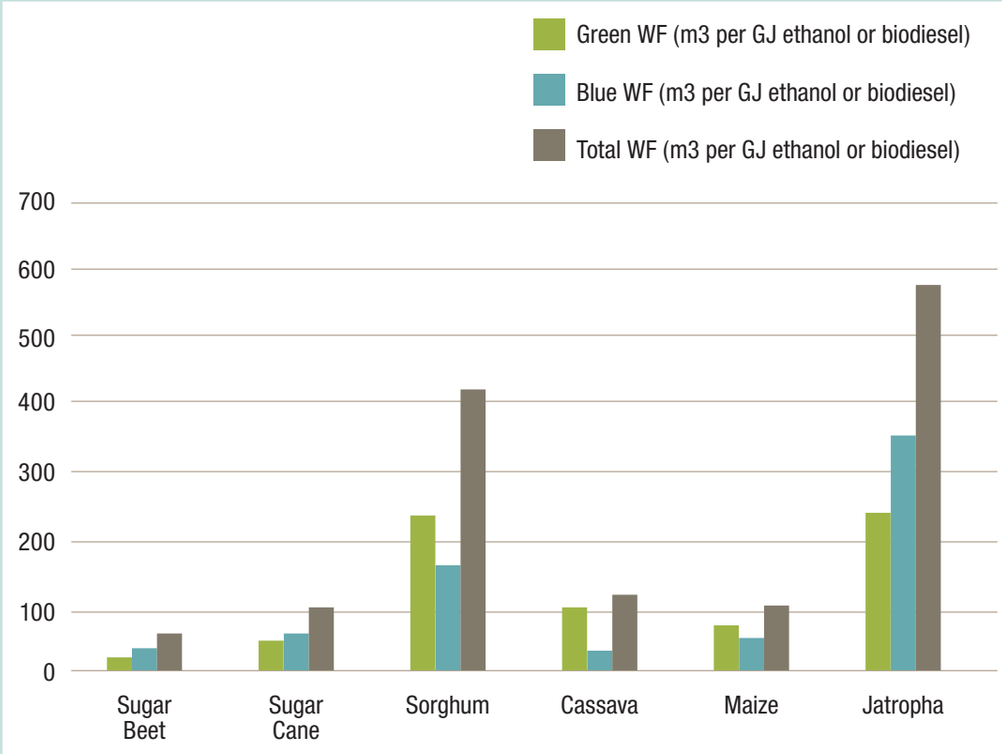
Water used in agricultural production for food and fibre accounted for 86% of the world's fresh water use in 2007 and 92% in 2012[53]. It is probable that water for bioenergy feedstocks played a part in this increase. However it is also known that other demands on water have also steadily increased, such as population growth. Africa is a vast continent with a highly geographically variable climate and water supply. The European Commission's Joint Research Centre's 2012 report on water scarcity in Africa[54] shows areas affected by water shortage at varying levels of severity. Such surveys should be taken into account in all forms of biofuels production, and indeed agricultural planning in general.

Academic analysis on the water footprint should be factored into decisions about the right feedstock used in the suitable regions for different needs. Gerbens-Leenes et al.[55] found that the Water Footprint (WF) of bioelectricity is smaller than that of biofuels and that it is more efficient to use whole biomass for electricity or as fuel for cooking.

The production of ethanol from some biomass is far less demanding on the water supply, including ethanol-based fuels from sugarbeet, while jatropha and grain sorghum demands more water.[56] In the WF method, green water relates to rainfall and precipitation while blue water refers to fresh surface and groundwater. [See Figure 1]

The use of knowledge like this can make a positive impact in areas where water is scarcer. Equally in areas of high irrigation potential, there is enough water to support a larger

Matching the crop type to local water availability can avoid impacts on water supplies



[Figure 1] – The global average water footprints of chosen energy crops used to produce bioethanol and biodiesel in the case of jatropha, due to limited data, the WF was calculated using the average figures from 5 countries (India, Indonesia, Nicaragua, Brazil and Guatemala)[57].

array of cultivation. FAO[57] found that DR Congo and Angola, as examples, had irrigation potential of 7 million and 3,7 million (ha) respectively, and while DRC used 0% of this potential, Angola only used 6%. From these two examples alone it is clear that water is not used to its full potential, nor is it used efficiently.

Water use in biofuel production doesn't just come from crop production but also processing. Nowadays there are technologies on the market that can help reduce water requirements for biofuel production, as well as to produce water as a by-product during the refining process. A clear example is the Dedini Sustainable Mill (DSM). While a typical sugar mill requires 23 litres of water per litre of ethanol produced from sugarcane in Brazil, the DSM exports 3,7 litres and does not require any water input, representing a good solution for African areas with water scarcity.

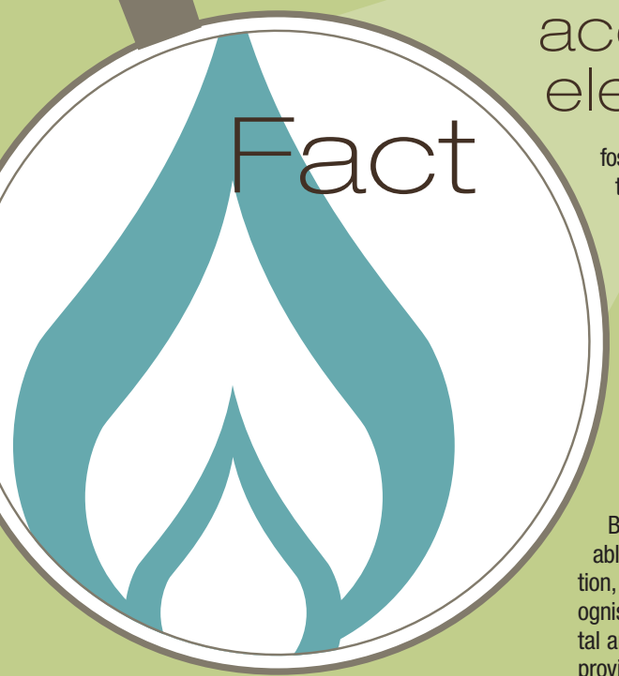
Any form of agriculture, whether for food or fuel, uses water, an aspect that must be factored in to agricultural decision-making processes, especially in drought-prone areas or areas with water scarcity. PANGEA recommends a full Life Cycle Assessment is performed during project development to ascertain the amount of water consumed at each stage in the production of biofuels.

Myth There isn't enough water to grow biofuels in Africa

Firstly to be clear, less than 0,05% of the world's biofuels are produced in Africa[58], comprising a very small amount relative to global capacity, underlining firstly the scale of this debate but also the need for a sensible policy for integration of sustainable biofuels into the energy mix.

The traditional practice of collecting firewood, and wood for charcoal for many off-grid rural farmers is a necessity for cooking. An average of 60%[59] of Africa's energy is imported, while the IEA's world energy outlook estimated that just 32% of Sub-Saharan Africans have access to electricity.[60] This means finding domestic sources of energy are paramount, so why not leap frog dirty fuels and go straight for clean? By producing bioenergy for community-level or family-level consumption, more time would be freed for other economically beneficial activities, such as health care and education.

60% of Africa's energy is imported. Only 32% of Sub-Saharan Africans have access to electricity



This sustainable production and use of biofuels can create a beneficial cycle and help communities become more sustainable. Moreover, this lessens the need for wood for charcoal, which has been shown to reduce the ecosystem services of many regions of Africa, while simultaneously boosting GHG savings and downgrading reliance on expensive fossil fuels. Biofuels can be fostered into a broad community-level energy mix for the benefit of all.

Although clearly there will be cases, as with any form of agriculture, where biofuels production will be unsustainable in Africa, a positive cycle can be introduced where small, managed biofuels production can be highly beneficial to a community, allowing time for other economically beneficial activities. There could also be a small surplus of biomass for sale or production of energy that may have a diverse range of uses.

But small-scale options are not the only sustainable biofuel options for Africa. Large-scale production, when done well and developed according to recognised sustainability criteria to ensure environmental and social benefits that lead to development, can provide opportunities for additional markets for crops, skilled jobs, technology transfer, energy access, increased food security, and improved local infrastructure—all of which are so sorely lacking in many parts of Africa. Good projects are needed, and the growing industry must demand this kind of adherence to sustainability in order to ensure project success as well as increased investor confidence that will lead to more sustainable projects in the future.

Myth Biofuel production is ruining Africa!

Biofuels can improve communities with increased food production, more and better jobs, and improved infrastructure

Some 63% of the population of Sub-Saharan Africa are rural dwellers, reaching nearly 600 million[61]. This underlines the scale of the challenge in ensuring subsistence and clean cooking fuel for this number. At least 76% of the entire population of Sub-Saharan Africa relies on traditional biomass fuels for cooking[62], meaning transition to modern bioenergy for cooking could have a quick and immediate impact.

There are increasing examples of local and foreign investment in biofuels in Africa that can be beneficial to African communities, especially when using an integrated approach that uses local labour, feedstocks and expertise. Biofuel production can raise the prosperity of local communities through increased agricultural productivity from technology transfer, add new semi-skilled and skilled jobs to the area, and increase infrastructure for all to use.

A project developed by Addax Bioenergy in Sierra Leone gave a competitive US$12 per hectare to local farmers, rather than landlords or officials, in conjunction with a development program to help farmers improve yields and ensure villagers have plenty to eat. This scheme also made sure that a local lawyer represented villagers[63]. Besides this increase in income, the Addax development program in February 2013 passed 397 local farmers from 10 villages in the region as graduates in modern farming techniques, and pest control methods after a 30-week course[64].

Programs like this can be powerful in developing regions as new techniques for increasing yield spread. This is a particularly poignant example of a situation where foreign investment can have a radically beneficial effect on the economic success and growth of a region.

A crucial element to community benefits is the growth in productivity and yield in all forms of agriculture. This drives human development as hunger levels are brought down thanks to increased access to food, and decent wages are introduced for labourers.

It has been shown that, under the right conditions, agricultural growth, which is achievable through biofuels production –arising in a plethora of economic benefits – can reduce poverty far more effectively than growth in other areas[65]. This effect is estimated to be 2,9 times more effective in increasing the average income of the poorest 20% of the population than growth in non-agricultural GDP[66]. As we have already shown, this feeds back to local level, through education and further increased yields. This will lead to higher wages, and crops for sale.

Biofuels can ultimately increase energy self-sufficiency at a national, regional, local and individual farmer level. Income generated from selling the fuel can feed back into investment in equipment and labour to further increase prosperity at a local-level.

Myth Local farmers and communities do not benefit from biofuel plantations.

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