BIO-ECONOMIES:

the EU's real 'Green Economy' agenda?

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A close inspection of some governments' proposals concerning the 'green economy' agenda being discussed at 'Rio+20' reveals an absolute determination to use it as a means of protecting and developing the banking, biotech, manufacturing, agribusiness and energy sectors, even at the expense of vulnerable communities and the environment. An important clue lies in the parallel development of 'bio-economies,' which are already a work in progress in a number of countries, including in the European Union. Bio-economies respond to the inevitable need to move away from fossil fuels, but do so by using biotechnologies to transform biomass into energy and an unlimited array of manufactured products. There is no emphasis on reducing consumption and it is acknowledged (in the small print in certain documents) that even with improved resource-use efficiency there will be significant increases in demand for biomass, both domestically produced and imported. This will in turn have severe impacts on forests and food production as land is inevitably given over to biomass-production. Yet the European Commission has recommended bio-economies as a key component of the Rio+20 agenda for a 'green economy in the context of sustainable development and poverty eradication'.

SUMMARY

Although the 'Rio+20' Earth Summit negotiations should be focused on the compelling and intuitively appealing idea of creating an economic process that recognises and respects the planet's limitations and promotes social and environmental justice, this is not what is on offer in Brazil. Rather, the Rio+20 version of the 'green economy' being promoted by countries such as those in the EU is a tantalising mirage, promising a clean green future but likely to deliver a parched and arid reality.

The problem is that governments – in their rush to draw in private investment, stabilise a volatile banking sector, and shore up manufacturing and energy supplies by reducing reliance on imported fossil fuels and natural resources – are turning a blind eye to the ethical and practical concerns raised by a headlong rush to commodify and commercialise biodiversity and the planet's ecosystem functions.

Yet these concerns are fundamental. They include objections to relying on complex market mechanisms already known to be vulnerable to fraud and profiteering; the ethics of commodifying and 'financialising' our natural heritage; the likelihood of increased and violent land grabbing; and the risks inherent in relying upon the whims of an unreliable and self-interested banking and finance sector to finance the whole process.

Importantly, there is also a great deal of uncertainty about what a 'green economy' will actually look like in practice. The giveaway clue lies in the parallel but rather more insidious development of 'bio-economies'. This approach, which also flies under the 'green' banner, is in fact an industrial development strategy focused on increasing energy and natural resource security, and creating new products and markets. Rio+20 may not have agreed a 'green economy' agenda yet but bio-economies are already a work in progress in a number of countries including EU countries, the US, China, Japan and Malaysia.

Critically, the European Commission has referred to its burgeoning bio-economy as the EU's contribution to the 'Rio+20' green economy agenda, and commends it to others. The bio-economy focus on improving resource efficiency certainly fits with the European Union's escalating concerns about securing cheap resource inputs to enable European manufacturing industries to continue to compete on global markets. This same concern is at the heart of European Union's aggressive Global Europe trade strategy and Raw Materials Initiative.

Specifically, the bio-economy approach aims to replace fossil fuels with biomass-based feedstocks, primarily sourced from crops, forests and the seas. Biotechnology, including nanotechnology and synthetic biology, is also integral since this is the means by which substantial quantities of biomass – which can include waste, but also harvested biomass

such as wood fibres, grass, bamboo, soybeans, corn or algae, for example – may be converted into a diverse and comprehensive range of products including bio-plastics, new drugs and bio-energy.

But herein lies an important conflict. Bio-economies are not intended to prevent the consumption of a never-ending stream of products, or to enable fairer access to the world's resources. In fact biomass-based bio-economies – and potentially the 'green economy' – are likely to ramp up demand for forests and land for industrial production, decimating the world's forests and biodiversity and triggering another relentless round of land grabbing. This is about as far away from social and environmental justice as it is possible to get.

The 'green economy' mirage shimmering in front of us needs to be seen for what it is. An approach based on bolstering the banking, biotech, manufacturing, agribusiness and energy sectors, which does not prioritise effective means of dealing with environmental crises or challenge the stark income and consumption disparities that still prevail, 20 years after the first Rio Earth Summit and more than a decade after the summit that agreed the Millennium Development Goals.

Systemic problems require genuinely systemic solutions. Social movements, indigenous and environmental organisations are calling for such solutions, which include an end to policies that precipitate land grabbing, biodiversity loss and the mass displacement of local communities. National subsidies for large-scale biomass and other unsustainable, risky investments should be replaced with public funding for sustainable wind, solar and tidal energy. Governments should also stop subsidising industrialised food production and instead offer significant funding for small-scale farmers: food sovereignty promotes local sustainable agriculture, land reform and shorter supply chains which would eradicate hunger, reduce wasteful consumption and benefit consumers, agricultural workers and the global environment.

INTRODUCTION

The 'green economy agenda' that is now such a prominent and controversial component of the UN Conference on Sustainable Development (UNCSD)'s 'Rio+20' Earth Summit process is based on ideas initially promoted by progressive environmentalists and academics such as Herman Daly,[1] who were concerned that governments were pursuing short-term economic policies based on unlimited growth, with little or no regard for the devastating long-term environmental consequences of those policies and related social impacts.

In recent years, however, the idea of the green economy has been progressively hijacked by business interests, invited to the table by governments such as those of the European Union, who are intent on leveraging private finance to save the public purse. But important questions about the ethics and efficacy of the 'green economy' agenda are being overlooked.

This failing can be seen even more clearly in the parallel but rather more insidious drive to develop biomass-based[2] bio-economies in many industrialised countries such as the EU, the US and Japan. This is also being promoted under a 'green' banner, even though it is likely to have significant negative environmental and social impacts, and is in fact an industrial development policy, designed to improve resource efficiency and resource security concerns in a bid to survive the current economic crisis. Once unleashed, however, the drive to create profitable 'green' industries looks set to become a stampede to market, meaning that even proposals and ideas that have severe social and environmental consequences may get the go ahead.

Within the green economy strand of the Rio+20 negotiations, concerns that have so far arisen have mostly focused on the very real possibility that the green economy approach is being used to push the concept of sustainable development – with its focus on poverty and developmental concerns - off the table. But there are other important moral and practical concerns inherent in the proposed process that are equally likely to impinge on people and their environment, especially given the proposed focus on commodifying, 'financialising' and effectively selling off the planet's biodiversity and ecosystem functions to the highest bidders - namely the notoriously volatile and fickle financial sector.

1 For more information about Herman Daly go to www.greengurus.co.uk/2009/10/herman-daly-steady-state-economics.html

2 Biomass is defined as biological materials from living or recently living organisms.

THE EU'S POSITION ON GREEN ECONOMICS

The European Commission promotes the idea of a green economy that *"can secure growth and development, while at the same time improving human well-being, providing decent jobs, reducing inequalities, tackling poverty and preserving the natural capital upon which we all depend."* [3] It argues that this will involve:

- establishing the right regulatory frameworks, including certification and standards
- creating strong incentives for markets and innovation, including market-based instruments such as taxes, tradable permits and environmental subsidies and 'payments for ecosystem services' (PES) schemes
- removing environmentally-harmful subsidies, liberalising trade in environmental goods and services and including 'sustainability' provisions in free trade agreements
- leveraging financial resources
- promoting entrepreneurship and greater private sector involvement including through new public-private financing schemes
- the 'proper valuation' of natural capital, and
- a revision of the way in which we measure growth and progress.

However, in spite of fine words about the need to protect and conserve biodiversity and natural resources, whilst promoting human-wellbeing, equality and jobs, there are deep inconsistencies in the EC's position. For example, it skates over the methodological problems associated with trying to assign a financial value to nature. It also continues to promote emissions trading (EC, 2011) as a solution, in spite of the parlous state of carbon markets over recent years (World Bank, 2011:47-50) (ironically because of the intransigence of industrialised countries, which have refused to agree an emissions cap even though this is precisely how demand for emissions permits is generated).

With a breathtaking display of double-speak the European Commission also observes that forests are critical for people's livelihoods around the world, but goes on to add that *"Forests are likely to become increasingly important in a green economy as sources of new materials such as bio-based plastics and in renewable energy strategies. In this context the conservation and sustainable management of forests is crucial."* (EC, 2011)

3 This definition is given Para 3.1 of EC (2011). The EU's official position is rather more succinctly expressed in the Information Note from the General Secretariat of the Council of the European Union to Delegations on 'Rio+20: towards achieving sustainable development by greening the economy and improving governance', 11 October 2011, 15388/11 http://register.consilium.europa.eu/pdf/en/11/st15/st15388.en11.pdf

The EU also overlooks its own role in creating a deeply unequal world in which European citizens have been responsible for a great deal of the world's overconsumption: the EC makes the bold observation that developing countries will benefit from transitioning to green economies, because a *"lack of access to quality resources, as well as insufficient knowledge on how to manage them sustainably, are important underlying causes of poverty."* (EC, 2011)

THE 'FINANCIALISATION OF NATURE': BRINGING IN THE BANKERS

The 'green economy' agenda means different things to different people, and the precise way in which it is interpreted and implemented by the Rio+20 process and elsewhere will define whether it helps or harms our future social and environmental development. The Green Economics Institute (GEI) in the UK, for example, argues forcefully for an end to systemic and institutional causes of inequity and poverty:

> *"Green Economics…therefore takes an inclusive approach, promoting fairness, equity, participation, freedom, democracy with social and environmental justice at its core… intergenerational equity and the rights of future generations are integral…Mainstream economics is still too bound up with concerns of price, profit, economic growth and the perspective of the owners of production versus the workers and therefore entirely fails to grasp this new reality"* (Kennett & Heinneman, 2006)

However, this approach is *not* reflected in current intergovernmental approaches to green economics, as championed by The Economics of Ecosystems and Biodiversity (TEEB) Study and the United Nations Environment Programme (UNEP)'s 'Green Economy Report' (both of which have been developed with business interests in mind, having been headed up by career banker Pavan Sukhdev, on secondment from Deutsche Bank[4]).

TEEB is hosted by UNEP, with financial support from the European Commission, Germany, the United Kingdom, Netherlands, Norway, Sweden and Japan.[5] Its recently published TEEB Study (TEEB, 2011), which underpins the approach to the green economy being discussed in the Rio+20 process, is generally based on the premise that environmental destruction is based on market failure, because environmental 'costs' have not been factored into the financial cost of final products.

4 Pavan is also the founder and chair of GIST Advisory, a consulting firm specialising in valuing and managing environmental impacts and dependencies; Chairperson of the World Economic Forum's Global Agenda Council on Biodiversity; and serves on the boards of the Stockholm Resilience Centre (SRC) and Conservation International (CI), and on UNDP's Advisory Panel on the Human Development Report and its Human Development Index (HDI). www.unep.org/greeneconomy/AboutGEI/WhoisGEI/BiographyPavanSukhdev/tabid/56208/Default.aspx

5 www.teebweb.org/AboutTEEB/Background/HistoryofTEEB/tabid/1247/Default.aspx

The TEEB solution is to ensure that biodiversity and ecosystem functions (commercially dubbed 'ecosystem services'), such as water and nutrient recycling, are assigned a financial value with a view to promoting efficiency and ensuring the real costs of environmental damage are recognised and met. TEEB also aims to draw business and industry into the new 'green economy' by encouraging companies to understand that their dependence on ecosystems makes them vulnerable to future shocks; and by showing them that it is also becoming possible to generate a considerable profit with respect to those same resources and systems (as do consultants McKinsey[6]). Critically, TEEB aims to put a value on nature and draw it into the economic process, rather than challenging and changing the economic process in order to protect our environment.

UNEP was also responsible for the 'Green Economy Report' published in February 2011, which moves the debate one step further down the commercial route, by focusing on the environment and ecosystems as new engines of growth, encouraging policy makers to create the *"enabling conditions"* for increased investment in the transition to a low-carbon green economy (UNEP, 2011). Upbeat and optimistic in tone, the emphasis is squarely on the environment as a business opportunity, with 600+ pages devoted to a sector-by-sector assessment.[7]

True, UNEP's report starts with reference to *"widespread disillusionment with the prevailing economic paradigm, a sense of fatigue emanating from the many concurrent crises and market failures experienced during the very first decade of the new millennium"* (UNEP, 2011:intro). But for all its talk of *"a new economic paradigm"* (UNEP, 2011:intro) it never dares to stray far from the path dictated by neoliberal etiquette, as if this is an immutable given, rather than the cause of all these crises.

UNEP argues that the problem is market failure. The solution, it concludes, must be removing price distortions, leveraging private investment, and creating *"markets establishing payments for providing ecosystem services, such as carbon sequestration, watershed protection, biodiversity benefits and landscape beauty"* (UNEP, 2011:550).

UNEP does add a number of caveats, although it is not clear to what extent governments are likely to take notice of these. They include a recommendation that *"a pro-poor orientation"* may need to be *"superimposed"* on the new green economy; that a degree of regulation is still essential; and that there should be greater reliance on traditional agriculture (UNEP, 2011).

6 McKinsey's approach (McKinsey, 2011) is predicated on addressing the increasing cost of resources and insecurity of supply, warning that this increases risks to companies, but also poses profit-making opportunities for those that seize the moment. This approach is based on recognising limited resource availability.

7 The report covers investing in natural capital (in the fields of agriculture, fisheries, water, and forests) and in energy and resource efficiency (with respect to renewable energy, manufacturing, waste, buildings, transport, tourism and cities).

Critically, however, UNEP also argues that, *"financial investment, banking and insurance are the major channels of private financing for a green economy."* (UNEP, 2011:588) The financial services and investment sectors control trillions of dollars and *"long-term public and private institutional investors, banks and insurance companies are increasingly interested in acquiring portfolios that minimize environmental, social and governance risks, while capitalising on emerging green technologies … Concentrated pools of assets, such as those controlled by pension systems and insurance companies, the US$39 trillion-plus controlled by the high net worth community and the growing assets of sovereign wealth funds will need to support the green economy in coming decades."* (UNEP, 2011:588) This call has certainly been heard. The EC, for example, makes no bones about the fact that it sees public funds as a means for leveraging finances on a much grander scale from the private sector, explicitly referencing *"channeling equity, insurance and pension funds towards sustainable development"*, and using public financing to reduce risks for private investors (EC, 2011:3.3).

This 'financialisation' of nature is already underway. Investment in *"BES asset classes"* – banking terminology for the world's biodiversity and so-called ecosystems services – currently covers private and compliance carbon markets (the biggest of which is the EU's Emissions Trading Scheme (ETS)), bio-prospecting contracts, certified agricultural products including non-timber forest products, certified forest products, private and public 'payments for ecosystem services' (PES) schemes, and private land trusts and conservation easements schemes.[8] *"Nascent existing markets and prospective future ones"* are also on UNEP's radar screen (UNEP, 2011:597). These include REDD+, the development of insurance markets for forest carbon, and the use of 'green bonds' to generate finance.[9]

Big business and its representatives have been instrumental in developing and commenting on 'green economy' proposals, with Pavan Sukhdev from Deutsche Bank leading the way on TEEB and UNEP's Green Economy Report. The International Chamber of Commerce (ICC) has also been closely involved in the UNEP process, pushing hard for a broad definition of 'green', with a view to including technologies such as nuclear and biotech, and a reduced emphasis on renewables. The ICC response was drafted by a working group including representatives of ExxonMobil, Shell, RBS, Monsanto, BASF and Suez, all of which have a highly controversial environmental record. One particularly influential person has been Chad Holliday, who leads Business Action for Sustainable Development 2012, the main vehicle for corporate campaigning towards Rio+20. Chad Holliday is Chairman of Bank of America and former Chief Executive Officer of Dupont.[10]

8 For more information see Table 4 (UNEP, 2011).

9 However, UNEP does recognise at least some methodological issues with, for example, carbon trading including reliance on the intergovernmental negotiating process to create demand (UNEP, 2011:600) and 'BES markets' estimating potential markets (UNEP, 2011:597).

10 Summarised from Hoedeman (2012).

FORESTS AND FINANCE: REDD+ AND FOREST BONDS

REDD (Reducing Emissions from Deforestation and forest Degradation) is based on the superficially attractive principle that those responsible for deforestation will stop cutting trees down if systems can be devised by which they can make more money by leaving them standing (by trading forest carbon 'credits', for example). In practice, however, REDD is a morally and methodologically problematic concept, that involves privatising and leasing or selling off much of the world's forest resources. Practically speaking, it may not work at all, because of the risk that the 'reduced deforestation' will simply take place somewhere else (in the absence of reduced demand for timber). Just as worryingly, REDD investors may exclude indigenous peoples and local communities from traditional forest areas, especially those without formal land tenure. Communities aiming to participate in REDD may also find themselves tangled up in complex forest carbon trading schemes in which they shoulder much of a project's financial risk. After much lobbying by the timber industry, "REDD+", the current version of the scheme, also incorporates 'sustainable forest management' and tree plantations. In practice this means that continued climate-damaging deforestation and the spread of land and water-hungry tree plantations could be subsidised with climate finance (FoEI, 2010).

A REDD-type project in southeastern Brazil, the Guaraqueçaba project, illustrates some of the pitfalls. It was set up a over decade ago by The Nature Conservancy, and the Sociedade de Pesquisa em Vida Selvagem e Educação Ambiental, with financial support from General Motors, Chevron Texaco and American Electric Power. Intended to combat global warming by sequestering CO_2, it is made up of three carbon projects: the Morro da Mina, Rio Cachoeira and Serra do Itaqui reserves. The traditional inhabitants of these territories now face limitations on their movements in their own lands, and many have moved to live in poverty in nearby towns. Some have faced imprisonment for using wood for traditional uses (housing); and others report intimidation by the project's armed park rangers when collecting food (Lang, 2009).

Forest bonds are another relatively new vehicle pulling in wealthy investors by promising sky-high rates of return on their investments. For example, EcoPlanet Bamboo, a company that sells bamboo as a strong, sustainable and renewable resource that can be used for diverse purposes, recently issued a forest bond[11] to raise some US$12 million to fund a new plantation in Nicaragua, Rio Kama. Its corporate prospectus explains that the 730 ha will have an estimated value of over US$100 million by 2016 and it is offering investors a fixed return of up to 503% over fifteen years, a spectacular rate of interest in today's economic climate, even over such a long time frame (GFC, 2011).

11 Forest-backed bonds (described as 'high credit quality debt securities') are another financial mechanism designed to draw private finance into forest conservation. See www.triplepundit.com/2011/09/conservation-alternative-investment-groups-team-forest-conservation-bond-market

This new and contorted version of the 'green economy', currently on the Rio+20 negotiating table, is effectively steering us into uncharted and potentially dangerous waters. The idea of greening our economies so that they are founded on and responsive to environmental and social concerns and objectives is eminently desirable, of course. But this is not what is being proposed. This is an agenda designed with the banking and financial sector in mind, rather than social and environmental justice.

The very act of assigning financial value to the planet's processes may make sense on a superficial level but is in fact a hugely political act. Adopting a 'banker's perspective' will result in passing the planet's systems and resources over to the financial industry and other industries in the faint hope that they will make a better job of it than governments have. This is a desperate measure given the appalling track record the financial services sector has; the known vulnerabilities, fraud and greed already associated with this type of market-based approach[12]; the severe consequences likely to be visited on the weakest and most marginalised peoples and communities around the world;[13] and the methodological complexities associated with valuing nature.[14]

The proposed 'green economy' as set out by TEEB and UNEP continues the current inequitable economic paradigm by favouring those with money to invest in the market opportunities being created. At the other end of the scale, those most immediately dependent upon direct access to the planet's resources may find themselves priced out of existence. It is unlikely that any 'pro-poor policies' put in place will be able to address this looming systemic shift in the ownership of the world's natural resources.

ANYTHING BUT 'GREEN': THE BIOMASS-GUZZLING BIO-ECONOMY

Although the 'green economy' agenda is only at the negotiating stage in the UNCSD Rio+20 process, another more subversive approach to creating financial value from the natural world is well underway, also under a 'green' banner. Known as the 'bio-economy', it involves transitioning economies away from fossil fuels, to resolve issues of resource insecurity and scarcity, and, according the World Economic Forum, to allay environmental concerns (WEF, 2010). In reality, however, the bio-economy agenda is anything but green: it is based on a massively scaled-up use of biomass and is about turning a profit, not protecting the environment. As such, it has the potential to decimate the world's forests and biodiversity

12 See for example, GFC (2011) and GFC (2008).

13 See for example, www.guardian.co.uk/global-development/poverty-matters/2011/apr/15/risks-over-increasing-global-land-deals

14 See for example, Gupea (2012) and www.mekong-protected-areas.org/mekong/docs/tlp-05.pdf

and usurp land needed to grow food. This is because the bio-economy approach specifically aims to replace fossil fuels with biomass-based feedstocks, primarily sourced from crops, forests and the seas, without reducing demand or consumption.

Biotechnologies are also integral to the bio-economy approach, enabling the conversion of substantial quantities of biomass – such as wood fibres, grass, bamboo, soybeans, corn or algae,[15] for example - into a diverse and comprehensive range of products including bio-plastics, new drugs and bio-energy. In general, the bio-economy primarily involves the agriculture, forestry, fisheries, biotechnology, chemicals and renewable energy sectors (EC, 2012).

> *"The shift to a bio-economy is real, it is happening now and the results of these efforts are already being leveraged for global competitive advantage."* (BC, 2011)

Bio-based production is set to experience rapid growth (WEF, 2010) and is already a work in progress in a number of countries including EU countries, the US,[16] China, Japan and Malaysia.[17] It is partly driven by the need to resolve the economic crises facing many industrialised countries. Competition between countries heavily engaged in elements of the 'bio-economy', such as industrial biotechnology and plant biotechnology, is also driving the process relentlessly onwards (EC, 2012). The targeted focus on improving resource efficiency also fits with the European Union's escalating concerns about securing cheap resource inputs to enable European manufacturing industries to continue to compete on global markets. This same concern is at the heart of the European Union's aggressive Global Europe trade strategy and Raw Materials Initiative,[18] and is undoubtedly a higher priority for the European Commission as a whole than the green economy debate.

This emphasis on bio-economies can clearly be seen in the Rio+20 position paper compiled by the European Commission, which has a great deal to say about the green economy, including what it is and what its potential benefits are for both the EU and other countries; but rather less to say about what the EU will do itself to contribute to the post-Rio+20 process, other than develop its own bio-economy, which is intended *"to pave the way to a lower emission, resource efficient and competitive society that reconciles food security with the sustainable use of renewable resources for industrial purposes and environmental protection."* (EC, 2012:11).

15 For more detail go to http://www.litrax.com/bio-plastics.html

16 For more information see www.foe.org/news/archives/2012-04-bioeconomy-blueprint-or-biotechnology-boost

17 For more information see www.biotechcorp.com.my/media/biomalaysia-plans-for-a-bioeconomy/

18 For a fuller explanation of the EU's Global Europe strategy and how it aims to secure raw materials for the EU's manufacturing sectors, see FoEE (2008).

This should be ringing alarm bells in many quarters, however, since bio-economies are likely to come into direct conflict with measures to promote food sovereignty, protect the world's forests and biodiversity, and mitigate climate change – hardly the objectives of the Rio+20 process. The lessons learned from promoting biofuels need to be taken on board. The Massachusetts Environmental Energy Alliance, for example, says that US Environmental Protection Agency statistics show that 'smokestack' carbon dioxide emissions from biomass are estimated to be around 50% higher than those of coal (MEEA, 2009). The EU's European Environment Agency (EEA) has also shown that bioenergy can substantially increase the levels of carbon dioxide in the atmosphere, just like burning coal, oil and gas, if implemented on an industrial scale (EEA, 2011).

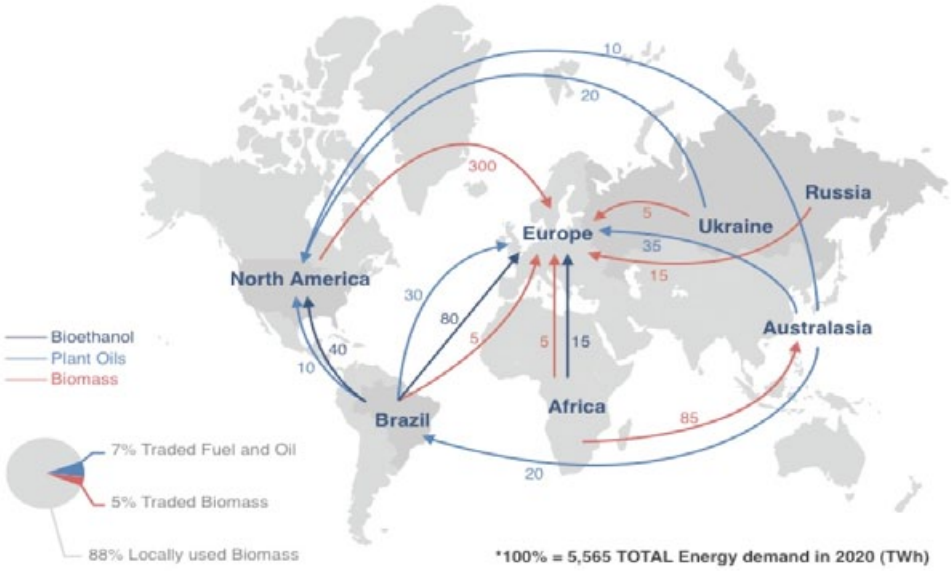
Turning to biomass will mean growing more tree and food crops, as well as using forestry and agricultural waste. But future growth in agriculture will predominantly take place in developing countries and, as raised during the European Commission's bio-economy consultations, there are concerns that this will dramatically increase pressure on natural resources, including forests and land for food production.

A European Commission report commissioned by the EC's Intelligent Energy-Europe programme, has also predicted that energy demand for biomass would exceed available material demand within Europe between 2015 and 2020 (Mantau *et al*., 2010), meaning that biomass imports would become a necessity. Demand for wood-based biomass, for example, could require over 300 million tonnes of wood by 2020 (Sikkema *et al.,* 2011). This trade is already underway: in Guyana, Liberia, Mozambique, Brazil, and the Republic of Congo, for example, energy companies and investors have already begun acquiring land for tree plantations wholly or partly grown for biomass energy exports to Europe (IIED, 2011). Nevertheless, EU policies continue to grant biomass a 'carbon neutral' status (CTW, 2012) and a UK government official has claimed that, *"there is no shortage of sustainably-sourced biomass in the world."* (BBC, 2011).

> *"There is a need for speeding up production rates and developing forest raw materials with new properties. Forests of the future will be increasingly dedicated to producing fibres, timber, energy or customised needs."* (EC, 2012:22).

The EU is not unaware of these concerns. Worries about food insecurity, over-exploitation of natural resources, decreasing biodiversity and increased deforestation due to food and non-food production have been raised consistently by civil society in recent years, with respect to biofuels, as well as in consultations on the bio-economy proposals (EC, 2012:22). The issue of *"sustainable biomass supply"* is duly referenced in the EC's position paper on developing a bio-economy (EC, 2012b). Yet the bio-economy – with its emphasis on resource productivity and biotechnology – is then presented as a solution to these problems, rather than as part of the problem.

Expected biomass trade routes.



Values represent final energy demand in 2020.

Source: WEF (2010)

However, elsewhere, tucked away in agricultural references in an internal staff working paper, the EC *has* recognised that resource efficiencies will not prevent a massively increased demand for biomass (which it hopes its agricultural producers can help to supply):

> *"The expected 70% increase in world food demand by 2050 and a steep increase in the demand for biomass for industrial purposes will and must trigger a supply reaction of EU agriculture, being one of the biggest suppliers to global agricultural markets".* (EC, 2012:19) (emphasis added)

> *"Contrary to the situation in EU, global nitrous oxide and methane emissions from agriculture are projected to increase by 50% by 2030 due to the growing global demand for meat and biomass for industrial and energy purposes.* " (EC, 2012:20) (emphasis added)

Perhaps the only forum where the potential impacts of bio-economies are really acknowledged at the moment is the Global-Bio-Pact project (which is co-funded by the EC and includes the Roundtable on Sustainable Biofuels). This is at least rather more explicit about the potential impact of biomass production on food insecurity and the links between environmental and socio-economic impacts. However, its final goal is developing *"global sustainability certification systems for biomass production, conversion systems and trade in order to prevent negative socio-economic impacts."* But certification is not the answer: spiralling demand for land means that even 'sustainable biomass' will increasingly displace other land-based activities which will them move elsewhere with their own social and environmental impacts unaccounted for.[19]

CORPORATE FUNDS POURING INTO BIOMASS PRODUCTION

Corporations are already jockeying for position with respect to biomass, and this is likely to escalate as biomass is used for the production of non-fuel products as well. The world's largest oil companies – including Shell, BP, Total, Petrobras, Chevron, Statoil, PetroChina, ConocoPhillips, Eni and ExxonMobil - have already spent billions of dollars investing in and scaling up biofuels production: 30 billion gallons were produced in 2011 (Pike, 2012). Shell and BP are considered best placed to benefit from the booming biofuels industry, with both engaged in producing biofuels from current 'first generation' sources such as sugar cane, and scaling up production in Brazil in particular. Both also have *"strong commitments to commercializing advanced biofuel pathways."* (Smartplanet, 2012) Other companies are also preparing to ramp up production in the near future though: PetroChina, for example, plans to add 1.1 million tonnes of biofuels production capacity and import 470,000 tonnes of those fuels by 2015, from countries such as Brazil (Reuters, 2011).

Source: GFC, 2012

19 For more detail on this subject see 'Biofuels and sustainability: Is certification the answer?', International Centre for Trade and Sustainable Development, http://ictsd.org/i/news/bioresreview/12094/

SWEEPING AWAY OBJECTIONS TO UNSAFE BIOTECHNOLOGIES?

Biotechnologies, including nanotechnology[20] and synthetic biology,[21] are an integral part of the bio-economy concept (OECD, 2009) because they are the means by which a relatively limited range of bio-based feedstocks are to be converted into an almost limitless range of fuels and products. But the gathering momentum behind the bio-economy drive means that objections and concerns about the safety of various technologies are likely to be paid increasingly scant attention.

Industrial biotechnology processes are being used to develop biologically derived products such as chemicals, bioenergy, food and feed from biomass, including through genetic modification (GM). The use of artificial micro-organisms for use in biotechnological applications, such as protein design and production, metabolic engineering,[22] carbon fixation, biomass production, biocatalysis,[23] biofuels and bioremediation[24] is also foreseen (EC, 2012).

The biotech industry has been and continues to be very much involved in the development of the bio-economy, standing to gain a great deal of governmental support in terms of policy, research and finance, and a new 'green' sheen. In Europe, the European Commission is already funding research into the construction of programmes that develop a European Knowledge Based Bio-Economy (KBBE), a sector estimated to be worth more than €1.5 trillion per year. Corporations are also moving to patent these new biotech applications, sometimes at such a rate that patent offices seem to be struggling to keep up with technological developments (IPO, 2011).

Existing companies are being joined by a dizzying range of new start-ups, as the industrial landscape shifts to accommodate the transition to biomass. The production of ethanol, for example, involves feedstock producers (ADM, Cargill), enzyme companies (Codexis, DSM, Lignol, Verenium, Novozymes), fermentation companies (Verdezyne, DuPont, DSM, Cargill), ethanol producers (ADM, Cargill, Abengoa, Cosan, POET), and oil companies such

20 Engineering at the molecular scale, for more information see http://www.etcgroup.org/en/issues/nanotechnology

21 Synthetic biology brings engineering and life sciences together with a view to creating articical living systems to perform a range of tasks. For more information go to http://www.etcgroup.org/en/issues/synthetic_biology

22 Metabolic engineering is a new field with applications in the production of chemicals, fuels, materials, pharmaceuticals, and medicine at the genetic level. For more information see http://www.nanowerk.com/news/newsid=25286.php

23 The use of natural substances to speed up or catalyse chemical reactions. See http://www.bio-catalyst.com/hot-and-new-in-biocatalysis/biocatalysis/

24 The use of natural processes (such as digestion by microbes) to clean up environmental pollution. See http://www.epa.gov/tio/download/citizens/bioremediation.pdf

as BP. The production of bio-ethylene[25] currently involves companies such as Chemtex, Total Petrochemcials, IFP Energies, Axen, Braskem, LanXess, Dow Chemicals, and Solvay (Laane, 2012).

5TH EUROPEAN FORUM FOR INDUSTRIAL BIOTECHNOLOGY AND THE BIOBASED ECONOMY

The EU's bio-economy is advancing so rapidly that 2012 will be the fifth year in which business and policy makers have met at the annual European Forum for Industrial Biotechology and the Biobased Economy, organised by Smithers Rapra and EuropaBio. Scheduled for October, the event will look at joint ventures from DSM and Roquette, BioAmber and Lanxess, and Avantium & Coca Cola, which will be *"framed in the context of the European strategy for the bio-economy"* as addressed by senior policy makers. Sessions will focus on finance, innovation, advanced biofuels and marine biotechnology, and the closing plenary will focus on Europe's role in 'globalising the bio-based economy.'

Source: www.efibforum.com

Europe is already a major player in the area of industrial biotechnology responsible for about 70% of world enzyme production (EC, 2012), so it already has a competitive advantage in this field which it wants to develop.

GM technologies, on the other hand, are deeply unpopular in the EU. Between 2005 and 2010, public concern over GMOs increased to 66% in the EU (EC, 2010), and in 2011 GM crops were grown on only 0.1% of arable land, and 19 member states cultivated no GM crops at all (FoEE, 2012). Transitioning to a bio-economy thus offers a major re-branding opportunity, which would in turn have significant negative affects on forests and biodiversity, especially if it promotes the development and use of fast-growing genetically engineered (GE) trees, as seems likely. In Brazil, for example, GM eucalyptus plantation trials have already been approved for biomass production (Bloomberg, 2012). In the US, the company ArborGen has petitioned the government to allow the release of GM eucalyptus seeds for bioenergy production (GJEP, 2012). But GE trees – such as invasive eucalyptus species for example - will inevitably and irreversibly contaminate natural forests with damaging genetically-engineered traits (GJEP, 2012)

25 Bioethylene is intended to replace ethylene, the most widely produced and used organic compound at present. http://pubs.acs.org/cen/coverstory/84/pdf/8428production.pdf

A change in the EU's approach to the use of genetic modification in the food and feed sectors could also have severe negative impacts on farmers, as the EU itself observes, saying that, *"emphasis of the bio-economy on goods and bio-technology based on genetic modification (GM) and biomass commodity production might lead to* a reindustrialisation and centralisation of the agri-food production, *which is more beneficial to large-scale companies, forcing small-scale producers in marginal regions and traditional biotechnologies*[26] *out of business."* (emphasis added)(EC, 2011b)

The European energy sector has an annual turnover in the region of €900 billion and employs some 1.2 million people (EC, 2012). However this is set to change rapidly, according to official projections (OECD, 2009). Production of both products and fuels in the bio-economy will take place in 'bio-refineries', the equivalent of petrochemical refinery processes. The EU aims to boost their competiveness and growth by scaling up investment for these bio-refineries. The World Economic Forum has predicted that the biorefining industry will generate €225 billion per year by 2020 (Laane, 2012).

Much of this biomass is likely to come from forests or tree plantations, implying significant increases in deforestation rates and the spread of tree monocultures. Bio-plastics, for example, may be made from forest resources, as the EC stated in February 2012: *"The world needs to reduce its dependence on petro-chemicals. Might the answer lie in our forests? A broadly-based European research consortium has been developing innovative ways in which wood-derived fibres and forestry by-products could replace petro-chemicals in a wide array of products – from car seats to plant pots."* (EC, 2012b)

The EC also emphasises the potential for marine biotechnologies which are estimated to grow at a rate of 12% per year with a current global market of €2.4 billion (EC, 2012). The quality of fresh water and marine ecosystems including fisheries in Europe and globally is already a major cause for concern. But so-called 'blue' biotechnologies are controversial responses to water conservation and enhancing food production, especially since certain pro-biotech advisors to the Commission have described oceans as the source of *"the next food revolution in human history."* (EC, 2010b) Investment in sea-based biomass could lead to coastal land grabs, and risky biotechnology could severely disrupt marine ecosystems. Furthermore, the technology remains unproven at present. The commercialisation of algal oil has not been possible to date, because algae prioritise *either* growth *or* oil production, but not both (Waltz, 2009; Lane, 2012).

26 Traditional biotechnology refers to ancient methods of farming as opposed to the intentional, industrial manipulation of DNA or genes.

FORBIOPLAST: TURNING THE WORLD'S FORESTS INTO POLYURETHANE FOAMS, CAR PARTS AND PLASTIC PACKAGING

The FORBIOPLAST project - Forest Resource Sustainability through Bio-Based-Composite Development - is funded by the European Commission. Focusing on forest resources, expected products include polyurethane foams, and wood-derived fibres to replace glass fibres and mineral fillers in automotive parts, and as a component in composites materials for application in packaging (cardboard, containers, etc.) and in the agriculture sector (mulching, greenhouses, tomato clips, pots etc). FORBIOPLAST's Industrial Advisory Board is composed of representatives of large companies like DOW, Stora Enso and Solvay as well as smaller businesses like Biomer and Euromaster (biopolymer providers). This *"provides top-level guidance and feedback to the Project Team to ensure the work continues to be focused on actions that are relevant to the needs of European industry and to help identify how the FORBIOPLAST results could be successfully applied in a variety of other application areas."*

Summarised from: http://www.forbioplast.eu/

CONCLUSIONS AND RECOMMENDATIONS

The European Union is one of the main proponents of the green economy agenda in Rio+20. As such it is deeply worrying that its main contribution to the 'green economy' debate seems to be its own internal efforts to develop a biomass based 'bio-economy', along with suggestions that other countries follow suit.

Transitioning to a bio-economy involves using a range of biotechnlogies to replace fossil fuels with biomass, sourced from the world's forest, cropland and seas, as well as from waste. Far from being about the environment, it is an industrial strategy designed to realign Europe's industry in a globally competitive world, primarily by: increasing resource efficiency and resource security; building on Europe's existing competitive edge in the field of industrial biotechnology; and rebranding plant biotechnology as a key component of future industrial activity. It is an agenda very much in keeping with the EU's aggressive Global Europe trade strategy and Raw Materials Initiative, designed by industry and driven by the need to keep Europe's head above choppy financial waters. It is not about the environment.

Systemic problems require real systemic solutions focused on protecting the environment and eradicating poverty and hunger. We need to move away from the neoliberal dynamic that is driving current economic and environmental crises, and look to solutions that are genuinely focused on social and environmental justice, not short-term economic considerations. There are many immediate steps that could be taken.

These include responding to the call - from social movements, indigenous and environmental organisations - for an end to policies that precipitate land grabbing, biodiversity loss and the mass displacement of local communities. This could be partially addressed by the establishment of national priorities that secure community access, control and rights over resources including fisheries, forests and land.[27]

National subsidies for large-scale biomass, fossil fuels, and other unsustainable, risky investments, should be replaced with public funding for sustainable wind, solar and tidal energy. The European Common Agricultural Policy (CAP) should stop subsidising industrialised food production and instead offer significant funding for small-scale farmers, helping to eradicate hunger.[28] Local sustainable agriculture, land reform, shorter supply chains and policies aimed at reducing wasteful consumption would all benefit consumers, agricultural workers and the global environment.

27 La Via Campesina, Land grabbing: La Via Campesina urges States to act, 11 May 2012 http://viacampesina.org/en/index.php?option=com_content&view=article&id=1266:land-grabbing-la-via-campesina-urges-states-to-act&catid=23:agrarian-reform&Itemid=36

28 European Coordination Via Campesina, International responsibility of CAP: joint statement, 12 March 2012 http://www.eurovia.org/spip.php?article569

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