Submission to Rio Plus 20 Zero Draft, from: Biofuelwatch, Global Forest Coalition, Global Justice Ecology Project, EcoNexus, Biomass Accountability Project, Partnership for Policy Integrity, PT AirWatchers (Port Townsend, Washington) and Ozark Riverkeepers Network.

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A "Green Economy" Cannot Run on Biofuels or Bioenergy

Bioenergy including liquid biofuels for transportation as well as the combustion or gasification of biomass, wastes etc. for heat and electricity, (and various other biomass substitutions for fossil energy) feature prominently in many visions of a "green economy". They are a crosscutting issue because of their relevance to energy, transportation, agriculture, food and water, soils, and forests and jobs and income. In sum, decisions about bioenergy are key on many fronts relevant to the mission of the UN Commission on Sustainable Development (UNCSD) and the goals of RioPlus20.

There is no question that fossil fuels are a leading cause of biosphere degradation, and weaning off of these fuels is critical. However, attempts to develop alternatives based on plant (or waste) substitutes worsen rather than resolves the problems. Abundant and irrefutable evidence demonstrate that commercial and industrial scale biofuels are failing to reduce emissions, while simultaneously contributing to a host of ills – increasing hunger, land grabs, ecosystem degradation, air and water pollution and more.

The UNCSD must reject commercial and industrial scale bioenergy and the subsidies and targets for it, and commit to a focus first and foremost on dramatically decreasing energy consumption in developed countries, while supporting the scale-up of truly clean and renewable energy sources: those which put minimum pressures on lands, water and soil resources, and do not involve polluting combustion.

1) Various studies have shown that, once direct and indirect land use-related changes in carbon stocks, including the time-lag between biomass combustion and sequestration of CO2 by new trees planted are taken into account, combustion of wood and other biomass for electricity and heat can result in substantial carbon and overall greenhouse gas emissions and translate into a carbon debt of decades or centuries, compared to equivalent amounts of energy generation from fossil fuels. Land use change related to large-scale production of crops and trees for bioenergy is associated with a wide range of very significant negative impacts on ecosystems and biodiversity.[i],[ii],[iii],[iv]

2) Estimates of biomass availability are grossly overestimated. References to large areas of available "marginal lands" is fictional and based on devaluation of the many uses of lands by indigenous peoples, peasant farmers, pastoralists, and for biodiversity, water and soil protection.[v] In their submission to the Rio Plus 20 zero draft, North American Indigenous Peoples point out*: "A world-wide "bio-economy" is proposed as the solution to climate change and sustainable development. Again, as in proposals for "market based solutions" to climate change, the Earth's biological resources are the target for this new "green" economy and the markets that it will create. The very basis of life, genetic material, both plant and animal, become potential markets in this formula. The experience of Indigenous Peoples, particularly those that inhabit bio-rich environments, is that their lands, territories, waters and total environments are targets for the new technologies, industrialized agriculture and the concentration of productive lands, their*

lands, in the hands of the private few, for the production of so-called "renewable" resources."

3) Attempts to gain access to lands to grow large quantities of biomass, as well as for food, are resulting in market speculation and investment in land - "land grabs" around the world. Recent research from International Land Coalition indicates about 44% of land grabs have been for the purpose of growing bioenergy crops.[vi] There is growing evidence that the increasing global demand for and trade in woodchips and wood pellets will lead to similar land-grabs as is the case with biofuels today.[vii], [viiiix], [x], [xi]

4) Different sectors – transportation, electricity, aviation, the military, chemicals production, plastics, pharmaceuticals, manufacturing and processing - are all seeking biofuel and biomass derived alternatives. When viewed in sum, this "bioeconomy" is massive in scope, and the full magnitude of demands for land (soils, water, forests) have not been adequately evaluated and recognized.[xii]

5) Demand for biomass is driving expansion of industrial monocultures, deforestation, replacement of natural forest with industrial tree plantations,[xiii] biodiversity loss, draining of water resources and soil degradation, and resulting in increased use of agrichemicals and fertilizers.[xiv] The lack of distinction between natural forest and tree plantations, (for example in the FAO formal definition of forest), results in incentives to replace natural forest with fast growing tree plantations, including exotic species, for pulp and biomass.

6) Escalating demand for biomass is contributing to rising food prices and worsening hunger.[xvi]

7) Failure to accurately account for emissions from combustion and from direct and indirect land use change associated with

bioenergy is resulting in subsidies[xvii] and supports intended for "clean renewable energy" being misused to fund dirty practices that worsen climate change, (in many cases emitting more CO2 per unit of energy generated than coal or natural gas)[xviii] as well as hazardous air pollutants[xix] and also soot.[xx]

8) Fast paced development of risky new technologies including synthetic biology (to develop microbes for production of cellulosic fuels, for example), nanotechnology and genetic engineering of trees are too risky, cannot be adequately regulated and should be halted.[xxi]

8) Attempts to "geo-engineer" the climate by burying charcoal (biochar) would create massive additional demand for plant biomass. Claims made about the efficacy of biochar for carbon sequestration and improving soil fertility are not supported by science.[xxii] "Bioenergy with Carbon Capture and Sequestration" (BECCS), proposed as a "carbon negative" technology, faces the same problems inherent to all other proposals requiring large quantities of biomass, (as well as problems associated with costs, energy requirements and reliability of CCS).

RECOMMENDATIONS:
>End subsidies and targets that are artificially supporting development of biofuels and bioenergy (including "waste to energy").

>Focus policies and supports on significantly reducing energy use and fulfill remaining demand from energy sources that minimize requirements for land, water, and soils and do not entail ongoing emissions of carbon or other pollutants, and respect the rights and basic needs of communities.

>Make protection and restoration of lands, ecosystems, soils and

waterways a top priority, not compromised by increased additional demands for biomass for energy generation.

>Amend the formal definition of forest used by FAO and others to ensure that tree plantations are not considered (hence supported, subsidized etc.) as "forests", as requested in an open letter from scientists around the world.[xxiii]

>Support recycling and zero waste strategies that eliminate waste rather than combusting it for energy generation.

>Ban release of genetically engineered microbes and trees

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[i] **Unintended Environmental Consequences of a Global Biofuels Program, Jerry M. Melillo et al, MIT Joint Program on the Science and Policy of Global Change, Report No. 168, January 2009,** www.calepa.ca.gov/cepc/2010/AsltonBird/AppAEx13.pdf) used a computable general equilibrium model of the world economy, the MIT Emissions Predictions and Policy Analysis Model and the Terrestrial Ecosystems Model to explore environmental consequences of an aggressive global cellulosic biofuels program up to 2050. A large-scale cellulosic biofuel programme would require similar or the same types of solid biomass feedstock as would be used for a large-scale biomass combustion with CCS programme. The study looked at two scenarios: One in which there were no restrictions on deforestation and in which any land would be available for biofuel production as long as it was economically viable ('deforestation scenario') and the other in which the conversion of natural forests and other 'unmanaged land' was limited to recent regional land conversion rates ('intensification scenario'). The study concluded that the total (direct and indirect) carbon debt from the first scenario would be up to 103 billion tonnes by 2050 and that from the second scenario up to 34 billion tonnes. The study also concluded that the more optimistic 'intensification scenario' would see the loss of 3.4 million km^2 of grasslands currently used for grazing, 38% of the natural forest cover and 38% of wooded savannah in sub-Saharan Africa based on 2000 figures. In Latin America, the same scenario would be associated with the loss of 20% of natural forests and savannah in Latin America. According to the authors: "*These losses [in both scenarios] have the potential to put thousands of endemic plant and animal species at risk across the globe, especially in the sub-tropical and tropical regions... The increases in co-opted NPP coupled with the loss of biodiversity have the potential to diminish the capacity of terrestrial ecosystems to deliver many of the support services that humans*

rely on, such as the cleansing of air and water. We currently do not understand the relationships between ecosystem structure and function well enough to predict when such disturbances in a region will move it beyond a critical threshold for delivering one or more essential ecosystem service (Carpenter, 2003; Walker and Meyers, 2004; Millennium Ecosystem Assessment, 2005)."

[ii] **The upfront carbon debt of bioenergy, Joanneum Research, May 2010,** www.birdlife.org/eu/pdfs/Bioenergy_Joanneum_Research.pdfThis study looks at the greenhouse gas balance of bioenergy from wood sourced from "sustainably managed" European Forests. It finds "*When the raw material is wood, the time needed to re-absorb the CO2 emitted in the atmosphere can be long, depending very much on the source of wood. This delay can create an upfront "carbon debt" that would substantially reduce the capability of bioenergy to reduce the greenhouse gas emissions (GHG) in the atmosphere in the short to medium term...Additional fellings for bioenergy can produce a decrease of the overall carbon stock in the forest that significantly affects the GHG balance of the bioenergy material. In the short-medium term (20-50 years), additional fellings could produce more emissions in the atmosphere than a fossil fuel system (CN<0). In such a case, the use of additional fellings would produce only very long term benefits, in the order of magnitude of 2-3 centuries.*"

[iii] **Fixing a critical climate accounting error, Timothy D. Searchinger et al, Science, Vol. 326, October 23, 2009,** www.princeton.edu/~tsearchi/writings/Fixing%20a%20Critical%20Climate%20Accounting%20ErrorEDITED-tim.pdf

This article provides a critique of the assumption that bioenergy can be routinely classed as 'carbon neutral', one which lies at the heart of the concept of 'carbon negative' bioenergy. The authors point out that "*The accounting now used for assessing compliance with carbon limits in the Kyoto Protocol and in climate legislation contains a far-reaching but fixable flaw that will severely undermine greenhouse gas reduction goals (1). It does not count CO2 emitted from tailpipes and smokestacks when bioenergy is being used, but it also does not count changes in emissions from land use when biomass for energy is harvested or grown...Several recent studies estimate that this error, applied globally, would create strong incentives to clear land as carbon caps tighten. ..If bioenergy crops displace forest or grassland, the carbon released from soils and vegetation, plus lost future sequestration, generates carbon debt, which counts against the carbon the crops absorb.*"

[iv] **Implications of Limiting CO2 Concentrations for Land Use and Energy, Marshall Wise et al, Science 324, 1183, May 2009**

This study models expected impacts of a climate change mitigation policies which put price on fossil fuel carbon only and ignore all emissions linked to bioenergy. The authors find: "*As the use of bioenergy increases, land uses shift from food and fibre crops, forests, and unmanaged ecosystems to dedicated biomass crops. This in turn increases terrestrial carbon emissions globally—a perverse result of curbing energy and industrial emissions...Placing an increasingly stringent tax on only the fossil fuel and industrial carbon emissions without placing any corresponding tax on terrestrial carbon*

(i.e., the FFICT [Fossil fuel and Industrial Emissions Carbon Tax] regime) causes land-use change emissions to increase to a peak greater than 10 Pg C per year, as lands are converted to meet the growing demands for purpose-grown bioenergy crops in a growing but decarbonising energy system (Fig. 1)...The result is that in the FFICT regimes virtually all land that is not required for growing food and forest products is used for growing bioenergy (Fig. 2)." In other words, a policy to significantly reduce fossil fuel emissions whilst classing all bioenergy as carbon neutral (the presumption behind BECS being 'carbon negative') will result in the destruction of virtually all remaining natural ecosystems, including natural forests and grasslands by the second half of the 21st century.

[v] **Agrofuels and the Myth of Marginal Lands: Gaia Foundation, African Biodiversity network, Biofuelwatch, Salva La Selva, Watch Indonesia, EcoNexus, 2008 Briefing.**

"A 2006 study by David Tilman et al estimates a high bioenergy potential from low-input cultivation of biodiverse, native perennial grass. This, the authors suggests, could become a feedstock for 'carbon negative' second generation agrofuels. They did no research on how much 'marginal land' is available. Instead, they relied on earlier estimates by different authors of how much 'abandoned cropland' was available – at least 500 million hectares, they, and other authors, claim. The term "marginal land" appears to have been merged with the "abandoned cropland" concept, which lies at the heart of many of the "bioenergy feasibility studies" that provide the "scientific basis" for governments' biofuel policies. Many of those, in turn, rely on earlier crude estimates of how much land could be made available, not for biofuels but for "carbon sinks", including tree plantations – which is where the 500 million hectare figure originates. They look at "abandoned cropland" which includes large areas of land where tropical forests were destroyed for plantations and cattle ranching and where soil degradation and water depletion now make agriculture difficult. As Goeren Berndes, who has reviewed 17 bioenergy feasibility studies remarks: "Land reported to be degraded is often the base of subsistence for the rural population." One example of how estimates for "abandoned cropland" useable for bioenergy are derived is a 2008 study by Christopher Field et al who suggest that 386 million hectares of such land exist. Any land believed to have been used as cropland at any time since 1700, and which satellite images don't show as being "cropland" today is classed as "abandoned" unless it is currently forested or part of urban settlements. There has been no critical review to assess the extent to which satellite-based mapping ignores small-scale mixed farming by communities, but it is clear that other community uses, including the use of land for pasture, are ignored when "abandoned cropland" is defined."

[vi] Future Agriculture Consortium: Land Grabbing in Africa: The New Politics of Food: 2011. http://www.future-agricultures.org/index.php?option=com_docman&task=doc_download&gid=1427&Itemid=510

[vii] **Biomass energy: another driver of land acquisitions? IIED briefing, August 2011.** http://pubs.iied.org/pdfs/17098IIED.pdf

"As governments in the global North look to diversify their economies away from fossil fuel and mitigate climate change, plans for biomass energy are growing fast. These are fuelling a sharp rise in the demand for wood, which, for some countries, could outstrip domestic supply capacity by as much as 600 per cent." http://pubs.iied.org/pdfs/17098IIED.pdf?

[viii] Future Agriculture Consortium: Land Grabbing in Africa: The New Politics of Food: 2011. http://www.future-agricultures.org/index.php?option=com_docman&task=doc_download&gid=1427&Itemid=510

[ix] GRAIN: Seized! The 2008 land grab for food and financial security. www.**grain**.org/a/93

[x] World Bank: Rising Global Interest in Farmland: Can it Yield Sustainable and Equitable Benefits? Sept 2010. Near 45 million hectares in "land deals" by 2009, mostly in Africa. Approximately 20% of those were made with intent of growing biofuel feedstocks.

[xi] **Biomass energy: another driver of land acquisitions? IIED briefing, August 2011.** http://pubs.iied.org/pdfs/17098IIED.pdf

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[xii] **The New Biomassters: Synthetic Biology and the Next Assault on Biodiversity and Livelihoods**. ETC Group, 2010.

[xiii] **Gibson et al. 2011, Primary forests are irreplaceable for sustaining tropical biodiversity. Nature 458: 378-381.**

"The rapid conversion of tropical forests for agriculture, timber production and other uses has generated vast, human-dominated landscapes with potentially dire consequences for tropical biodiversity."

[xiv] Ibid

[xvi] **Price Volatility and Food Security**: FAO: High Level Panel of Experts, Report 1. July 2011:
"Biofuel support policies in the United States and the European Union have created a demand shock that is widely considered to be one of the major causes of the international food price rise of 2007/08."…"Given the major roles played by biofuels in diverting food to energy use, the

CFS should demand of governments the abolition of targets on biofuels and the removal of subsidies and tariffs on biofuel production and processing."

[xvii] Biomass Electricity: Clean Energy Subsidies for a Dirty Industry. Biomass Accountability Project. June 2011. http://www.nobiomassburning.org/BAP/Home.html

"Billions of dollars in taxpayer money is going to build dirty biomass incinerators, while health, environmental, community and fiscal watchdog groups fight them at the local, state and national levels. Dozens of communities have rejected proposals for biomass combustion power and many more are actively fighting them. These subsidies are intended for clean energy but biomass is one of the most expensive, inefficient, and polluting forms of electricity generation."

[xviii] http://www.pfpi.net/carbon-emissions

"It's often claimed that biomass is a "low carbon" or "carbon neutral" fuel, meaning that carbon emitted by biomass burning won't contribute to climate change. But in fact, biomass burning power plants emit 150% the CO2 of coal, and 300 – 400% the CO2 of natural gas, per unit energy produced.These facts are not controversial and are borne out by actual air permit numbers."

[xix] http://www.pfpi.net/air-pollution-2

"Burning biomass emits large amounts of pollutants, just like burning other solid fuels such as coal. Burning organic material emits particulate matter (PM), nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO2), lead, mercury, and other hazardous air pollutants (HAPs)."

[xx] The UNECE"s Executive Body for the Convention on Long-Range Transboundary Air Pollution has set up a dedicated expert group to tackle Black Carbon **tinyurl.com/6dllwaw** "In 2009, the Executive Body of the Convention recognized that black carbon poses significant risks to human health and the environment. It has a significant climate forcing impact, leading to increased warming, particularly in areas covered by snow and ice, such as the Arctic." Official greenhouse gas balances used for bio-energy and 'energy from waste' take no account of the warming effect of black carbon and are therefore underestimating the climate damage resulting from biomass, bioliquid combustion (and waste) incineration.

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[xxii] Biochar: A Critical Review of Science and Policy. Biofuelwatch 2011 http://www.biofuelwatch.org.uk/2011/a-critical-review-of-biochar-science-and-policy/

Provides a review of science from field studies. Data show that biochar additions may not result in any overall increases in soil carbon (**Fate of soil-applied black carbon: downward migration, leaching and soil respiration, Julie Major at all, Global Change Biology, Volume 16, Issue 4, April 2010; Long term effects of manure, charcoal and mineral fertilization on crop production and fertility on a highly**

weathered Central Amazonian upland soil, Christoph Steiner et al, 2007, Plant Soil DOI 10.1007/s11104-007-9193-9 AND **Nitrogen Retention and Plant Uptake on a highly weathered central Amazonian Ferralsol amended with Compost and Charcoal, Christoph Steiner et al, J. Plant Nutr. Soil Sci. 2008, 171, 893–899**) or that soil carbon sequestration from biochar may be no greater than that from common organic fertiliser use (**See figures in Stability and stabilisation of biochar and green manure in soil with different organic carbon contents, Joseph M. Kimetu and Johannes Lehmann, Soil Research 48(7) 577–585, 29th September 2010**). Published field trials show that using different rates of the same type of biochar in the same region can have impacts on crop yields which vary from negative to neutral to positive, even over a short period (See for example: **Biochar amendment techniques for upland rice production in Northern Laos, 1. Soil physical properties, leaf SPAD and grain yield, Hidetoshi Asai et al, Field Crops Research 111 (2009) 81:4)**. Similarly, biochar impacts on mycorrhizal fungi have been shown to vary from positive to neutral to negative and biochar-fungi interactions are not fully understood at present (**Mycorrhizal responses to biochar in soil – concepts and mechanisms, Daniel D. Warnock et al, Plant Soil (2007) 300:9–20**). Like other biomass based technologies, conversion of large areas of land to provide feedstocks is concerning. A recent assessment of a global biochar potential shows that sequestering 12% of annual anthropogenic greenhouse gas emissions would require conversion of about 556 million hectares to dedicated biomass plantations, as well as the large-scale mobilization of forest and agricultural residues. **Sustainable biochar to mitigate global climate change, Dominic Woolf et al, Nature Communications 1, Article 56, 10th August 2010**.

[xxiii] **Open Letter to the FAO from Scientists**: World Rainforest Movement, Sept 21 2011. http://wrm.org.uy/forests/letter_to_the_FAO.html
"FAO defines "forest" as "land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ."(*) Under this definition, it has been possible to replace primary forests with monoclonal plantations of genetically engineered exotic tree species, without this being considered as deforestation. This definition has also made it possible to use the term "forest" to refer to the industrial monoculture tree plantations that are expanding at the expense of the destruction of other ecosystems.Matters are made worse by the fact that other UN organizations and initiatives, such as the UN Framework Convention on Climate Change, as well as numerous national governments, implement this definition in negotiations, programmes and policies."