

## Land use and global warming

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Global warming is regarded as a major threat to human wellbeing and the environment. It has consistently inspired a political agenda endorsed by the European Union as well as international bodies, several countries, and most environmental groups. Despite the concern about the possible consequences of global warming, however, scientific uncertainty is still relevant. For example, the present state of scientific knowledge is not clear enough to reasonably predict how much warming will occur in the next century. Likewise, the causes of the observed warming are still in discussion, particularly with regard to the extent to which anthropogenic emissions of greenhouse gases (GHGs) affect the climate as opposed to natural drivers, such as variations in the solar cycle, that go well beyond mankind's ability to control the climate. Moreover, even if scenarios were more accurate, it would still be very hard to predict the spatial and time distribution of global warming in the forthcoming decades, as well as the actual impact of climate change on humans and the environment.

Notwithstanding the high level of scientific uncertainty, European policy-makers believe that action is to be taken according to the precautionary principle, that assets that when the scientific evidence is not clear-cut, precautionary measures should be taken as to avoid potential negative consequence of an action (or lack thereof). The most important policy measure which is suggested to address global warming is the Kyoto Protocol, that entered into effect on 16 February 2005 and requires developed countries to cut their GHGs emissions by some 5 percent below 1990 levels by 2008-12. However, major emitters such as the United States have not ratified the Kyoto Protocol; other big polluters, including such emerging economies as India and Cina, are not required to undertake any reduction in their fast-growing emissions. The Kyoto Protocol is therefore flawed because on the one hand it makes scientific assumptions that are questionable to say the least, on the other hand it doesn't require any commitment by countries that are going to account for a large part of global emissions in the next few years. Moreover, while calling the present generation to bear huge costs that may or may not deliver any significant benefit to the future generations, it make assumptions on the future generations' preferences as well, that are impossible to know. It would be more profitable to pursue alternative strategies, particularly strategies that can (a) pass a cost-benefit test; (b) deliver benefits to the present generation; and (c) help the future generations to be best equipped to face the potentially negative consequences of global warming. One such policy – also known as no regret policies – is carbon sequestration.

Sequestration is about trapping carbon that is emitted by various sources (particularly power generation from hydrocarbons) in the so called carbon sinks. A sink is a reservoir that is increasing in size, where GHGs can be captured. If carbon dioxide and other greenhouse gases can be trapped in a sink, they can be freely emitted in the first place, as what ultimately matters is the amount of GHGs released in the atmosphere, that is the net emissions (the difference between the gross emissions and the trapped emissions). If the atmospheric concentration of GHGs is little or no altered by man-mande emissions, than little or no anthropogenic climate change is expected. Sinks can be natural or artificial; growing vegetation, particularly forests, work as a sink. While the Kyoto Protocol recognizes the importance of sinks, the strategy of carbon sequestration has not been seriously pursued so far.

Carbon sinks can deliver more benefits than those directly associated with preventing global warming. For instance, reforestation provides an aesthetic benefit due to the presence of more trees and wildlife, and possibly a direct economic benefit if, for example, trees are grown for wood or celluloid, or if there is a tourist interest in the area. In terms of fighting global warming, reforestation is efficient not just because it helps to reduce GHGs emissions: in fact as long as there

is a demand for environmental sustainable technologies or practices – no matter how much anthropogenic emissions actually impact global climate – reforestation responds to a need that some people is willing to pay for. That means, for example, that power companies may want to invest in reforestation as a marketing strategy as to purport themselves as environment friendly, and this in turn may increase the number of their customers who value environmental responsibility in making business.

Of course, reforestation – and more generally the creation of carbon sinks – is not without costs. While a more precise analysis should be performed, what can be said in the first place is that the cost of reforestation is equal to the value of alternatives that are given up, such as farming the land. The value of farming is equal to the market revenue of the crops plus the subsidies, both monetary and regulatory (including the effect of trade barriers) that the farmer gets through the Common Agricultural Policy (CAP). In other words, CAP creates an incentive to farm the marginal land, and by so doing it prevents the market to work – particularly by increasing the cost of reforestation to energy intensive companies that might regard reforestation as a tool to appeal consumers. Hence, assuming that the demand of environmental goods (including measures that can offset GHGs emissions, such as carbon sequestration) can't be changed, a way to increase the provision of environmental goods is to cut or cancel subsidies and other regulatory barriers in order to achieve a fair competition between alternative land uses. That is consistent with a property-rights based approach to land management, as subsidies (beyond the distortions they cause in the internal as well as international markets) alter the price structure of land uses. That introduces two major flaws in the way market works:

- By arbitrarily increasing the value of certain crops instead of others, subsidies potentially result in an inefficient land use. In fact, absent subsidies, the choices regarding land use would be driven by land productivity as well as the value that consumers see in agricultural products (including the value they see in a forest that captures carbon emissions from, say, a coal-fired power plant).
- Secondly, the creation of a system of monetary and regulatory subsidies implies that winners and losers are arbitrarily picked among the competing firms or technologies or land uses. That leaves much room for corruption, and – even more dangerous – for ideologically-oriented choices that have little or nothing to do with efficiency or environmental performance.

It is impossible to tell in principle whether or not reforestation can be a cost-effective strategy to address climate change – if compared with other measures aimed at cutting emissions. Likewise, the present state of scientific knowledge is not clear enough as to tell whether or not a reduction of net GHGs emissions will impact the climate in measurable way. Yet what matters is that a growing number of people are concerned about climate change, and are willing to pay more for the sake of consuming emissions-free products. That suggests that energy-intensive companies might have an interest in investing in emissions-free technologies and to advertise it. Carbon sequestration through reforestation may provide a useful tool to meet that demand. It also has side benefits that may be valued highly even if the alleged future benefits are left aside.

Unfortunately, CAP – which is strongly defended by several member States in the European Union – makes it more costly to pursue such an environment-friendly, market-based strategy. CAP raises the value of farming vis-à-vis alternative uses, including reforestation. Hence, it doesn't just raise the actual price of crops to European consumers and creates a framework of unfair competition with the farmers in the developing world: it also has an environmentally questionable outcome. More generally, it alters the structure of incentives governing land use, particularly because – being strongly dependent upon political decisions – it creates a climate of uncertainty and promotes the rent seekers' activities in orienting European policies towards picking winners and losers. A serious reform of CAP – and possibly the eventual opening of European agricultural market to foreign

competitors with no regulatory or monetary barriers, including import duties and subsidies to domestic producers – is needed also to promote a fair market of land resources, where land use responds to market demand rather than bureaucratic incentives. The removal of obstacles and distortions would be a necessary step towards a market-oriented environmental policy.