ASB Lecture Note 14

International Market for Forest Carbon Offsets:

How these offsets are created and traded

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November 2012

Nairobi, Kenya

ASB Partnership for the Tropical Forest Margins

World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

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Background to this Lecture Note

A carbon offset or credit is equal to a ton of carbon (or 3.67 tons of carbon dioxide) that does not flow into the atmosphere or is absorbed from the atmosphere. Other Greenhouse gases (GHG) such as nitrous oxide and methane too have carbon dioxide equivalents that are used to estimate carbon credits. Carbon credits are the currency in which carbon markets deal – a way for market mechanisms to drive industrial and commercial processes in the direction of low emissions of carbon dioxide and other GHGs into the atmosphere.

There are many ways in which carbon credits are produced. Examples include renewable energy projects and shifting from coal-fired power plants to hydroelectric ones. This lecture note explains how carbon credits or offsets are generated from the forestry sector - both in terms of growing new trees as well as protecting existing ones, and how they are traded in international markets. It is important to note that these projects and the resultant offsets are only a part of a long set of solutions that the international community is considering to address climate change. We also explain why in spite of the surge in international carbon markets, actual trading in forestry carbon offsets remains low. The lecture note is primarily meant to share information among ICRAF's (World Agroforestry Centre) local partners in South East Asia and Africa on how to engage in international markets for forestry carbon offsets. However, the note will also be useful for government officials, NGO functionaries, private sector operators, and community representatives in other developing countries who wish to access international carbon market to sell locally produced carbon offsets from forestry and other conservation oriented activities, or even to just understand how the market operates.

Indeed, despite the prolific increase in reference material on ecosystem services, particularly forest carbon services, there is a relative dearth of literature that explains basic concepts in easily accessible language. For instance, why is someone willing to pay for not cutting down trees (or for planting new ones) when that person (or company) is not even located in the same country? Or why don't we see many forest carbon projects even when international carbon markets are now worth billions of dollars? We attempt to answer these questions by using key economic concepts such as cap and trade that help generate carbon offsets, and by explaining how international carbon markets are further segregated into voluntary and compliance based markets, each with its own rules on how forest carbon offsets can be traded.

The note can be used in several different ways, either as a stand-alone document that people read on their own, or as part of a larger workshop/training on ecosystem services where a specific session is devoted to forest carbon. The note is divided into different modules that are followed by some exercises that participants can do in small groups. The appendix at the end provides a list of useful sources to access additional material on any of the topics covered. In order to maintain simplicity, we focus on the main aspects of the carbon market - the way trading takes place, differentiating between carbon sequestration and maintenance of forest carbon stocks, and the role of carbon standards. We believe that once the target audience understands key market concepts, it would be much easier for them to access more technical literature on these issues.

Acknowledgements

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Sara Namirembe has been working as a Research Analyst, Environmental Services with the World Agroforestry Centre since October 2010. She coordinates the project on Pro-poor Rewards for Environmental Services in Africa (PRESA). Previously, she worked with the Katoomba Group's Incubator Program. Before that, she coordinated projects promoting participatory forest management (PFM) within Uganda and worked as a lecturer in the Faculty of Forestry and Nature Conservation, Makerere University. Sara holds a PhD from the University of Wales, UK and an MSc from the University of New Brunswick, Canada.

List of Acronyms

A/R	Afforestation and Reforestation
AFOLU	Agriculture, Forestry and Other Land Use
CCBA	Climate, Community and Biodiversity Alliance
CCBS	Climate, Community and Biodiversity Standard
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CERs	Certified Emission Reduction Units
CI	Conservation International
DNA	Designated National Authority
EUETS	European Union Emission Trading Scheme
Face	Forests Absorbing Carbon-dioxide Emissions
FCPF	Forest Carbon Partnership Facility
FIP	Forest Investment Program
FONAFIFO	Fondo Nacional de Financiamiento Forestall (The National Forestry Financing Fund)
GHG	Greenhouse Gases
ICRAF	World Agroforestry Centre
ICROA	International Carbon and Offset Reduction Alliance
INFAPRO	The Innoprise-FACE Foundation Rainforest Rehabilitation Project
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
JICA	Japan International Cooperation Agency
KPLC	Kenya Power and Lighting Company
LED	Light-emitting Diode
LULUCF	Land Use, Land Use Change and Forestry
MONRE	Ministry of Natural Resources and Environment

NGO	Non-governmental Organization
NSWGGAS	New South Wales Greenhouse Gas Abatement Scheme
OTC	Over The Counter
PES	Payments for Ecosystem Services/Payments for Environmental Services
PFM	Participatory Forest Management
PIN	Project Identification Note
PRESA	Pro poor Rewards for Environmental Services in Africa
REALU	Reducing Emissions from All Land Uses
REDD	Reducing Emissions from Deforestation and forest Degradation
REDD+	Reducing Emissions from Deforestation and forest Degradation
RGGI	Regional Greenhouse House Gas Initiative
TCERs	Temporary Certified Emissions Reductions
TIST	The International Small Group and Tree Planting Program
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VOS	Voluntary Offset Standard
WWF	World Wildlife Fund

Learning objectives

- To promote understanding of the meaning of forest carbon offsets, how these offsets are generated, and traded in international markets.
- To provide essential information on operation of international carbon markets, how these are segregated and the difference between project finance and market-based transactions.
- To promote understanding of the role of carbon standards in helping local forestry projects sell their offsets in international markets.

Target audience

National and sub-national policy makers in developing countries, NGO officials, local researchers, private companies that are interested in participating in carbon markets, and representatives of local communities that are involved in forest-based carbon initiatives.

Expected background knowledge

We expect the reader to have a basic understanding of how and why climate change is caused. It would also be helpful to know about community forestry projects in developing countries.

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MODULE 1

What are Forest Carbon Offsets?

Recognizing that climate change is indeed happening at a fast pace and that mitigation actions need to be undertaken, more than 160 nations met in 1997 in Kyoto, Japan to negotiate binding limitations on carbon emissions by developed nations, in accordance with the objectives of the United Nations Framework Convention on Climate Change (UNFCCC) signed five years earlier. The outcome of the meeting was the Kyoto Protocol which came into force in 2005 and, in which the industrialized countries and economies in transition—the so-called Annex 1 countries[1]—agreed to cut their overall carbon emissions during the first commitment period (2008-2012) by an average of 5.2% (with countries varying in their commitments) relative to the levels emitted in 1990.

These countries could achieve emission reduction by decreasing internal emissions or by trading emissions with one another. In additon, Annex 1 countries had the option of selecting an approach that minimised costs entailed in emission reduction. The Kyoto Protocol also introduced the Clean Development Mechanism (CDM) by which industrialized countries could purchase emission reduction credits or offsets from projects in non-Annex 1 countries (mostly developing countries). CDM guidelines were developed for emission reduction through many different sectors including renewable energy and capture of methane from waste disposal sites. One of these was the forestry sector.

Forests play two major roles in mitigating climate change; one, by removing carbon dioxide (CO_2) from the atmosphere as they grow, and two, by storing previously absorbed carbon in their biomass for long periods of time. For instance, when barren lands are converted into forests, trees sequester (or absorb) CO_2 from the atmosphere and store it as woody biomass and soil organic matter. According to experts, planting trees on unforested lands can help remove 100 billion tons of carbon (tC)[2] from the atmosphere, which is equivalent to 10-20% of the probable fossil fuel emissions over the next 50 years (IPCC, 2001). Conversely, existing tropical forests store about 638 giga tons of carbon (GtC), much of which can go back to the atmosphere if these forests are cut down. Forests can also become a source of methane when organic matter decomposes in waterlogged soils (e.g peat lands), or of nitrous oxide when organic matter is burnt. On average, deforestation leads to emission of 1.2 Pg C (1.2 billion tons of carbon) per year, equivalent to about 12% of human induced greenhouse gas emissions (van der Werf et al. 2009). Therefore, tropical forests can help restore the CO_2 balance in the atmosphere, both when new trees are added and when old ones are preserved.

Since CO_2 is a uniformly mixing gas, growing trees anywhere have the same effect on carbon balance in the atmosphere[3]. Although, sustainable management and further enrichment of existing forests was excluded from Kyoto Protocol, recent rounds of UNFCCC have reintroduced

[1] Annex I countries defined under the UNFCCC are mostly defined as Annex B countries under the Kyoto Protocol.
[2] 1 tC = 3.67 tCO_2.
[3] Ironically, this is also the reason why carbon emissions released from anywhere also have the same effect on the carbon balance in the atmosphere.

forest conservation into the climate change negotiations. Under this program, which is also known as Reducing Emissions from Deforestation and Forest Degradation (REDD),countries can invest in sustainable forest management activities, especially in the tropics. We discuss the REDD program in more detail later on in the lecture note.

CO_2 is mainly stored as woody biomass in trees[4]. Recent advances allow for accurate measurement of CO_2 sequestered by a given stand of trees or the amount of carbon released when existing forests are cut. This facilitates an arrangement where a corporation, government, or even an individual can invest in projects that sequester or reduce carbon emissions on their behalf. They usually buy what are called carbon offsets, each offset unit being equal to a ton of CO_2 (tCO_2) which is either removed from the atmosphere through afforestation/reforestation projects or prevented from being released through projects that reduce deforestation. The World Resources Institute defines a carbon offset as *"a unit of carbon dioxide-equivalent (CO_2e) that is reduced, avoided, or sequestered to compensate for emissions occurring elsewhere"* (Goodward and Kelly 2010).

A carbon dioxide equivalent is a standard unit for expressing the impact of other greenhouse gases in terms of amounts of CO_2 that could create an equivalent impact on climate over a period of 100 years. For instance, a ton of methane will cause the same amount of warming as 23 tons of CO_2. Therefore the CO_2 equivalent of methane is 23 CO_2e. Similarly, nitrous oxide is 296 CO_2e, and hydro fluoro-carbons more than 10,000 CO_2e[5].

One of the first large scale forest-based carbon sequestration projects in the world was the Face (Forests Absorbing Carbon-dioxide Emissions) Foundation Rainforest Rehabilitation Project (INFAPRO) to regenerate 25,000 hectares of forests in Malaysia (Aukland et al, 2002), and 25,000 ha in Uganda (www.face-thefuture.com). The Ecosystem Marketplace estimates that there are now more than 220 forest carbon projects around the world managing 2.1 million ha of land and produce carbon offsets that are worth millions of dollars (Ecosystem Marketplace, 2011). In many of these projects, local farmers and landowners (sellers) receive payments for pro-forest practices that generate carbon offsets for international investors (buyers). Often the buyers objective is to offset the emissions caused by their own actions. Because the effect on the atmosphere is the same regardless of where the carbon offsets are generated, buyers can purchase these offsets from anywhere in the world. As aresult the forest carbon sector in developing countries is a significant player in the global action to mitigate climate change and a source of valuable carbon offsets which are in demand by international investors and multilateral organizations.

Since alot has already been written on the potential pros and cons of carbon offset projects for local communities (e.g. see Jindal, 2010 and Aune et al, 2005), in the following modules, we mainly focus on the market itself – what constitutes an offset, how many offsets are currently being sold, at what price, and its potential in the near future. Although we concentrate on forest carbon offsets, wherever necessary, we also indicate main similarities and differences with the trade in other kinds of offsets. Along the way, helpful resources are pointed out for more detailed information.

[4]Usually one ton of woody biomass in trees is equal to about 0.47 ton of carbon, or 1.84 tCO_2.
[5]Source: U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2002, Annex 6.

Exercise A

1. How do tropical forests help mitigate climate change?
2. What are forest carbon offsets? How are they created?
3. Who are sellers and buyers of carbon offsets?

MODULE 2

How Forest Carbon Offsets are Traded: Cap and Trade

Trade in carbon offsets is primarily based on a market-based regulatory regime called cap and trade[6]. A cap and trade mechanism involves three main steps. An environmental or government agency of any industrialized country (such as Norway or Japan) first decides the maximum level of emissions for a country or for a sector within a country. This is called a cap. The target caps for European Union nations average about 8% reductions, while for Japan and Canada, it is about 6% (Ecosystem Marketplace 2007). This cap is divided among the participating companies or organizations, either as a proportion of their historical emissions, or by auctioning the reduced level to which they can emit. The cap is then successively lowered and each participating company has to reduce its emissions by a certain percentage each year. However, companies that find it expensive to reduce their emissions can also buy emission reductions or offsets from other companies leading to a cap and trade system. Let us review this through a simple example illustrated in Table 1.

Table 1: Understanding Cap and Trade

	Year	Company A (tCO_2)	Company B (tCO_2)
Original emissions	1	100	100
Reduction target	2	90	90
Actual achieved	2	85 →	95

There are two companies in a country that are under the purview of the environmental agency. Emissions from each of them have been capped at 100 tons of carbon dioxide (tCO_2) per year at the start of the program. They are now directed to reduce their emissions by 10%, which means that each of the companies has to reduce its emissions by 10 tCO_2. However, Company 'A' is successful in over-achieving its reduction target (say by better technology) and reduces to 85 tCO_2 while Company 'B' is only able to reduce its emissions to 95 tCO_2 (against its target of reducing to 90 tCO_2). Company 'A' now has a surplus of 5 tCO_2 which it can sell to Company 'B' as carbon offsets (each offset being equal to 1 tCO_2). If the price of these offsets is lower than the cost of emission reduction for Company 'B', it will buy these offsets (at a price higher than or equal to cost of emission reduction for Company 'A') and so both companies will achieve their target of 90 tCO_2. This is how a cap and trade emission system works and it can occur between countries too. When this kind of trade occurs between Annex 1 countries, it is known as Joint Implementation and the units traded equivalent to one tonne of CO_2 are known as

[6] A small proportion of the trade in carbon offsets also takes place without a cap, especially when companies and governments participate in emission reduction on a voluntary basis. In this case, carbon offsets are traded through voluntary markets or direct over the counter.

Emission Reduction Units. The same example can now be extended to trade in forest carbon offsets (Table 2 below).

Table 2: Trade in carbon sequestration offsets

	Year	Farmer A (tCO_2)	Company B (tCO_2)
Original emissions	1	0	100
Reduction target	2	0	90
Actual achieved	2	- 5	95

Now, let us assume that apart from Company 'B', there is also Farmer 'A' who owns a piece of land without trees in Year 1. By growing trees during the year, the farmer helps in absorbing 5 tCO_2 from the atmosphere (hence the negative sign) as compared to Company 'B' which reduces its emissions to 95 tCO_2 against its target of 90 tCO_2. The 5 tCO_2 absorbed or sequestered by farmers' trees in Year 2 are carbon offsets that s/he can sell to Company 'B' which helps the company in achieving its emission reduction target of 90 tCO_2. Note that the farmer's action is completely voluntary since s/he did not face any reduction target and so s/he has 5 tCO_2 to sell to Company 'B'. Since CO_2 is a uniformly mixing gas in the atmosphere, the farmer can be based anywhere, even in another country[7]. Indeed, it is cheaper for Company 'B' to buy carbon offsets from a farmer based in a developing country where the cost of land and labor is less than in an industrialized country. This is the rationale behind Kyoto Protocol's CDM and and the units traded equivalent to one tonne of CO_2 are known as Certified Emission Reduction units (CERs).

Potential trade in carbon offsets under the new REDD (reducing emissions from deforestation and forest degradation) system can be seen as follows (Table 3). We have Company 'B' as before which is capped at 100 tCO_2 in Year 1 and is required to reduce its emissions to 90 tCO_2 in Year 2. However, it only reduces by 5 tCO_2 and is still emitting 95 tCO_2 in Year 2. At the same time, Forest 'A' has been emitting 10 tCO_2 per annum due to deforestation and degradation (local people cutting down trees, converting parts of forest to agricultural land for commercial farming, or for local infrastructure development that requires clearing forest area).

However, due to enhanced conservation and protection measures, the deforestation rate is reduced and by Year 2, the forest is only emitting 5 tCO_2 (again a voluntary action). Forest 'A' has thus been able to reduce 5 tCO_2 which would have gone into the atmosphere in the absence of these enhanced protection measures. Therefore they count as carbon offsets that can be sold to Company 'B' to help meet its emission reduction target.

[7]Interestingly, if Company 'A' from Table 1 is also operating in the economy, there will be excess supply of carbon offsets: 5 tCO_2 from Company 'A' and 5 tCO_2 from Farmer 'A', while there is demand for only 5 tCO_2 from Company 'B'. Competition between Company 'A' and Farmer 'A' will determine the market price of the offsets.

As we move to different segments of the market for carbon offsets, it is important to keep in mind that in case of carbon sequestration offsets (Table 2) and REDD offsets (Table 3), it is not necessary for only Company 'B' to buy these offsets. These forest carbon offsets can also be bought by national governments, international environmental groups, or other multilateral organizations, as a way to promote forest conservation and more sustainable land use at the local level. This is because many of these international groups now see direct economic incentives in the form of carbon payments as an effective way to induce conservation.

Table 3: Trade in REDD offsetst

	Year	Forest A (tCO_2)	Company B (tCO_2)
Annual emissions	1	10	100
Reduction target	2	0	90
Actual emissions	2	5	95

Exercise B

1. What is meant by cap and trade? How does it work?
2. What are the key issues industries or companies would be concerned about when participating in cap and trade schemes?
3. Discuss the pros and cons of cap and trade versus direct emission reduction.

MODULE 3

Different Segments of the International Carbon Market

Demand for carbon offsets has rapidly grown into a global market consisting of two broad segments: legislated and voluntary. Each of these segments can include trading in carbon offsets or a direct exchange between a buyer and seller (producer) through project-based transactions (Bayon et al, 2007). This leads to four distinct types of transactions for carbon offsets (Table 4).

Table 4: Four kinds of transactions for carbon offsets

	Trading in carbon offsets	Project-based transactions
Legislated	European Union Emission Trading Scheme NSW GGAS	Clean Development Mechanism (Kyoto Protocol)
Voluntary	Chicago Climate Exchange (ceased to trade after 2011)	Voluntary Forest Carbon and REDD+ Projects

Source: Adapted from Jindal and Kerr, 2007a

Trading in carbon offsets under a cap and trade system requires participating organizations to reduce their carbon emissions by a certain target. As we saw in the previous discussion (Table 1 and 2), these organizations or companies can either reduce their own emissions or purchase carbon offsets from other companies that have over-achieved their emission reduction targets. Another option for emission reduction is to buy offsets from farmers and other land managers who produce offsets through forestry or other conservation activities.

Trading works very much like a stock market or an equity market; all offsets that attain a globally agreed standard are treated alike and can come from any source – reduced use of fossil fuels, capture of greenhouse gases from landfills, shift to renewable energy, or planting of trees to sequester carbon. The buyers do not invest in any specific project, they use a trading platform to buy offsets from sellers who either generate these offsets or bought them from someone else (e.g. a broker).

The European Union Emission Trading Scheme is the biggest such market in the world. Other notable examples include the New South Wales Greenhouse Gas Abatement Scheme in Australia (NSW GGAS) and the Regional Greenhouse Gas Initiative in the US. Table 5 provides a summary of the most recent data on various kinds of carbon markets that currently operate in the world. It is important to keep in mind that there are very few exchanges that currently allow

trading in carbon offsets from forestry projects – afforestation and reforestation (A/R) or even REDD projects. As we discuss in Module 5 below, this is because of the issues of additionality, leakage, and permanence attached with forestry carbon offsets.

Table 5 shows the updated data on volume of offsets traded and their total sales for the major carbon markets that currently operate in the world. As we can see, the total volume of carbon offsets traded across the globe was 8,835 million tCO_2 which increased to 10, 189 million tCO_2 in 2011. The corresponding value of these offsets was $159, 210 million in 2010 which increased to $176, 027 million in 2011 (Peters-Stanley et al 2012).

Table 5: Growth of Global Carbon Markets

Market	Volume (million tCO_2)		Value (US$ million)	
	2010	2011	2010	2011
Voluntary (over the counter)	128	93	422	572
CCX	2	0	0.2	0
Others	2	2	11	4
Total Voluntary	133	95	433	576
Total Legislated	8,702	10,094	158,777	175,451
Total Global	8,835	10,189	159,210	176,027

Source: Ecosystem Marketplace (Peters-Stanley et al 2012)

(I) Legislated transactions

Many carbon reduction schemes operate under a regulatory regime that requires participating entities to reduce their emissions by a certain percentage. This emission reduction is required by law and there are strict penalties if the target is not achieved within a stipulated time period. Such laws have been formulated at local, national, and international levels. Legislated transactions can include both trading in carbon offsets using a market platform, and directly investing in project based emission reductions. Overall, the legislated transactions constitute more than 99% of the global carbon market, both in terms of the volume and the dollar value of all the offsets traded in different parts of the world. As Table 5 shows, legislated markets led to a total trade of 10,094 million tCO_2 in 2011, with a total value of $175,451million.

International legislation

The Kyoto Protocol requires participating industrialized countries to reduce their carbon emissions to 5.2% below 1990 levels by 2012. Under the Kyoto Protocol's Clean Development Mechanism (CDM), industrialized countries can achieve their targets by investing in carbon emissions reduction or sequestration projects in developing countries. These projects earn carbon sequestration offsets (called Certified Emission Reductions or CERs, each unit equivalent to one ton of CO_2) for the investor. The trading in carbon offsets from these projects is in the form of project based transactions where the price of carbon offsets is negotiated directly

between the producers and the buyers (companies located in industrialized countries; see Figure 2). Box 1 defines some key terms that are used to assess the viability of carbon projects – project-based carbon sequestration or emission reduction should be additional, should fully address the threat of leakage and the trees need to be protected for a stipulated time period.

BOX 1. Some key principles for carbon projects

Baseline	-	A reference level or counterfactual showing the trend of carbon emissions in the absence of a project aimed at reducing carbon emissions
Additionality	-	Number of carbon offsets produced that would not have been possible without the project
Leakage	-	The possibility of projects triggering increased emission production outside their boundaries
Permanence	-	Persistence of emission reduction over time

Source: Charlene Watson[8]

The CDM website mentions a total of 35 carbon sequestration projects that have been registered by 2012 (http://www.cdmpipeline.org/). These projects are based in several developing countries such as China, India, Brazil, Moldova, Uganda, Peru, Ethiopia, Nicaragua, and Vietnam (Box 2 provides details of one such project while box 3 lists some examples of forestry and non-forestry CDM projects in Africa; to obtain more details on CDM, visit http://cdm.unfccc.int/). The first CERs from forestry projects were issued in April 2012 with many more to follow. However, uncertainty regarding the continuation of Kyoto Protocol beyond 2012 may have an adverse impact on the registration of new carbon sequestration projects. From the producers' point of view, there are significant transaction costs involved in planning and designing a CDM project (including establishing the project, finding buyers, negotiating contracts, etc.) and these may be worthless if the Kyoto Protocol or the CDM are discontinued after 2012 and the demand for forestry offsets subsides.

BOX 2: Cao Phong Reforestation Project, Vietnam

This carbon sequestration cum ecorestoration project was approved by the CDM Executive Board in 2009. The project is located in the communes of Xuan Phong and Bac Phong. It involves planting 365 ha of severely degraded area with *Acacia mangium* and *Acacia auriculiformis* plantations on a 15 year rotation. The project will produce carbon offsets of 2665 tCO_2 per annum. The project was initially funded by Japan International Cooperation Agency (JICA) and is being implemented in cooperation with Vietnam Forestry University, Research Center for Forest Ecology and Environment, and Department of Forestry under the Ministry of Agriculture and Rural Development.
Source: UNFCCC, 2011.

[8]Charlene Watson. Forest Carbon Accounting: Overview & Principles. UNDP, UNEP CDM Capacity Development in Eastern and Southern Africa

Legislated emission reduction through cap and trade

The European Union Emission Trading Scheme (EU ETS), was initiated in 2005 to assist European countries fulfil their emission reduction targets under the Kyoto Protocol. It uses a cap and trade system under which participating companies either reduce their carbon emissions by a certain percentage each year or purchase emission reduction offsets from others. This system recognizes all three mechanisms for generating and trading carbon offsets:

a) Emissions Trading – trading in carbon offsets among participating companies, as discussed in Table 1 above.
b) Joint Implementation – investing in carbon reduction projects in other industrialized countries.
c) Clean Development Mechanism – investing in carbon reduction projects in developing countries.

In 2010 alone, the EU ETS traded in carbon offsets was worth $119.8 billion (Linacre et al, 2011). As of May, 2011 the average price on EU ETS was $28.33 per tCO_2 (Ecosystem Marketplace, 2011). However, none of these offsets came from forestry projects, since the EU ETS currently does not allow for trading in forestry carbon offsets. In addition, the price of offsets on the exchange has since crashed due to uncertainty over the continuity of the Kyoto Protocol beyond 2012.

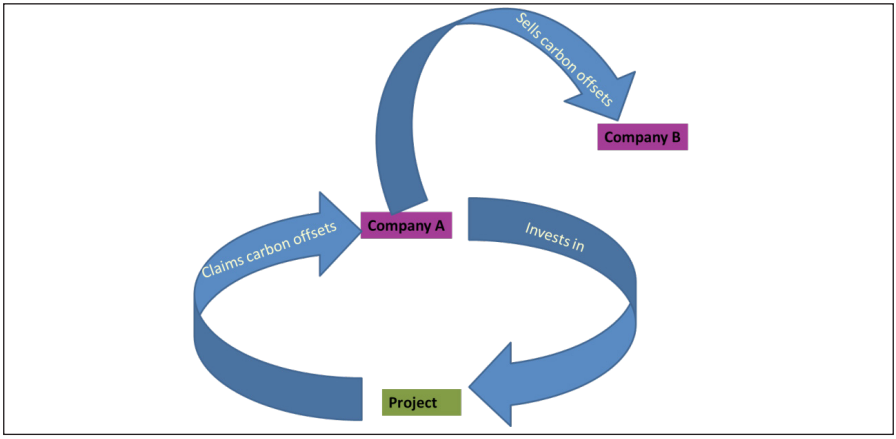

Figure1: *In project-based transactions, a company can invest in a project and claim offsets it generates for offsetting the company's emissions (this is called the primary market for carbon offsets) or it may sell the offsets to another company at a profit (secondary market for carbon offsets). Examples: TIST and DANONE.*

Local level legislation

Under the *Regional Greenhouse House Gas Initiative (RGGI),* medium to large size power plants in ten northeastern states in the US (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont) are required to reduce

their carbon emissions by 10% below their 1990 levels by 2018 (see http://www.rggi.org/home). These power plants can both buy and sell emission reduction offsets to other power plants as well as claim offsets by investing in carbon emission reduction projects within those ten states (Figure 1).

Similarly, the *New South Wales Greenhouse Gas Abatement Scheme* in Australia operates under local legislation mandating all local power plants to reduce their carbon emissions by 5% between 2003 and 2012. If the participants are unable to achieve these emission reductions, they pay a penalty of $17 per ton of shortfall (see http://www.greenhousegas.nsw.gov.au/). Emission reduction can be achieved through project-based transactions, including carbon sequestration through forestry activities. To date five afforestation and reforestation projects have been registered to generate carbon sequestration offsets under this scheme and each of these projects is required to maintain a specific tree cover for a minimum of 100 years to generate permanence[9].

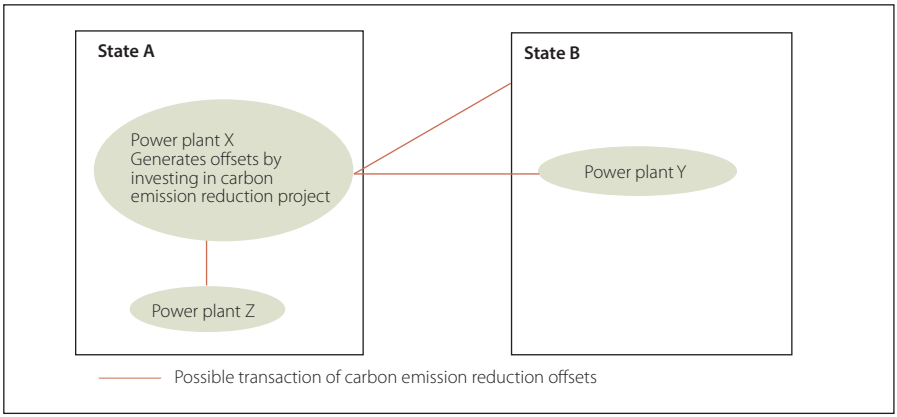

Figure 2: *Potential transactions in carbon emission-reduction offsets by states covered by a law aimed at cutting emissions by an agreed percentage of a benchmark over a specified period of time.*

(II) Voluntary transactions

Many companies, governments and even individuals purchase carbon offsets on a voluntary basis, either for philanthropic reasons or to experiment with voluntary carbon reduction programs before participating in the legislated ones. This is also called 'pre-compliance'. Due to rising awareness about the harmful effects of global warming, many companies and other big organizations invest in carbon reduction activities as part of their corporate social responsibility. When the transactions are made directly with project developers on a project basis, they are usually called over-the-counter sales, especially if they are outside the purview

[9] In a way, permanence is unique to carbon sequestration; once a tree is cut, it may lose all the carbon it has sequestered over the years. To avoid this, projects stipulate a minimum number of years that the trees must be preserved in order to generate saleable carbon offsets, though this time period can vary from one regulatory regime to another and from one project to another.

of any legislated or voluntary exchange (such as EU ETS that we discussed earlier). As we can see from Table 5, until 2010, the US-based Chicago Climate Exchange (CCX) was the biggest Cap and Trade based voluntary market in the world. At its peak, CCX traded 69 million tCO_2 in 2008 valued at $307 million (Hamilton et al., 2010a). However, the CCX virtually shut down in 2011 after its parent company was sold out.

Overall, the voluntary carbon market sold 128 million tCO_2 in 2010 at an average price of $6 per tCO_2; the total value of the voluntary market being $424 million. Although, the total volume fell down to 93 million tCO_2 in 2011, the total sale value increased to $572 million (Table 5). Many of these offsets came from SouthEast Asia including projects based in the Philippines, Malaysia and Indonesia. However, average price for these offsets was lower than the average price on legislated markets due to a common perception that voluntary transactions may not stand the rigorous quality standards that legislative offsets are subjected to.

Since the voluntary market does not have 'one standard' price, the producers of voluntary offsets have to often negotiate price with each separate buyer or for each separate project. Many developing country producers who either have a limited understanding of the international market or low bargaining power (say due to excess supply of carbon offsets or due to sunk costs in the form of upfront investments that were already made in the project), may thus end up accepting considerably lower prices than the prevalent price in the compliance market.

Exercise C

1. What are four main segments of the international carbon market? Give examples of each.
2. How do legislated emission reduction transactions differ from voluntary transactions? Are carbon prices the same in these? If not, why?
3. What is the difference between cap-and-trade and project-based transactions?

MODULE 4

What are Carbon Standards?

Just like other international trade products such as certified organic or fair-trade commodities, carbon certification standards were developed to ensure that carbon offsets are real and verifiable and follow social and environmental safeguards. Standards reflect quality, enable trust in international transactions and can sometimes lead to premium prices. Projects seek international certifications or standards that verify the genuine nature of offsets they generate. There are several carbon offset standards or certifications which differ in terms of determining additionality, baselines, start dates and creditation periods, co-benefits, validation and third party verification requirements, registries used, rules and pricing[10].

It is worth noting that certification is expensive and can become more so if not considered at the beginning of the project. In the voluntary markets, standards are regulated according to the ICROA (International Carbon and Offset Reduction Alliance) Code, a self-regulating policy mechanism for the voluntary carbon market that ensures that carbon offsets are real, independently verified, permanent and additional and can be tracked in an independent registry. The registry ensures that credits are not sold twice. Figure 3 lists the steps involved in certification of carbon offsets.

Figure 3: *Steps towards certification of a carbon-offset project*

CDM Standard

The CDM Standard is part of the international legally binding Kyoto Protocol and is administered by the UNFCCC. The CDM also has a CDM afforestation/reforestation standard. The CDM Accreditation standard describes the mandatory levels or degrees of attainment or performance, designed to achieve a uniform approach to compliance as a mechanism under the Kyoto protocol. For example, a Project Identification Note (PIN) should be submitted to the Designated National Authority (DNA) in the host country (where the actual project will be located). Once the project meets the national criteria set up by the respective DNA (e.g. providing sustainable development benefits to local community), it is forwarded to the CDM's Executive Board[11]. In order to address concerns regarding permanence of forestry carbon

[10] Usually, there is a certification fee entailed, which has to be borne by the agency that is running the carbon project.
[11] In Vietnam, the Ministry of Natural Resources and the Environment (MONRE) is the Designated National Authority for CDM. See UNFCCC website on DNA in other countries http://cdm.unfccc.int/DNA/index.html?click=dna_forum.

stocks, CDM recognizes two kinds of offsets – temporary certified emissions reductions (tCERs) and long-term certified emission reductions (lCERs). tCERs must be reissued every five years while lCERs have a 20-year life-span but must be re-verified at five-year intervals. Countries may only use tCERs to defer their emission reduction obligations, since eventually they must be replaced by offsets from "permanent" reductions, such as those from energy efficiency, renewable energy, or fuel switching projects. It should be noted that the liability for re-issuing rests with the buyer (unless stipulated otherwise in contracts).

BOX 3: Examples of CDM projects in Africa

Forestry

1. The Humbo Assisted Natural Regeneratioin Project in Ethiopia
   Expected sequestration: 880,000 tCO_2 over 30years
   Buyer: BioCarbon Fund to purchase 165,000 tCO_2
2. Green Resources projects in Uganda and Tanzania

Non-forestry

1. Uganda Municipal waste management
   Methane emissions trapped: 750,000 tCO_2 eq. over 10 years
2. Kenya Lifestraw Family water filter project
   Estimated avoided emission: about 2 million tCO_2
3. Ecosecurities hand-held light-emitting diode (LED) in Tanzania
   Estmated avoided emission: 700,000 tCO_2
4. Kenya Power and Lighting Company (KPLC) project

Sources: Garcia (2010); Ecosecurities (2011)

Gold Standard

The Gold Standard aims at ensuring that emission reduction projects (in the Clean Development Mechanism (CDM) Joint Implementation (JI) and Voluntary Carbon Market not only generate verifiable carbon offsets, but also make measurable contributions to sustainable development. The standard was developed by a group of environmental NGOs led by the World Wildlife Fund (WWF). It brands new Carbon Offsets whether from legislated or voluntary transactions. The downside is that its additional demands and documentation make the validation and verification process more complicated and expensive. As expected, the Gold Standard receives high premium on the price of carbon offsets with an offset selling for an average of $10 per tCO_2 in 2011 (Peters-Stanley *et al,* 2012).

Verified Carbon Standard

Another key standard is the **Verified Carbon Standard** (VCS) formerly the Voluntary Carbon Standard (VCS) which was developed by the Climate Group, the International Emissions Trading Association, and the World Business Council for Sustainable Development. The standard covers all types of projects including agriculture, forestry and other land use (AFOLU) projects to generate what are called Voluntary Carbon Units, each unit being equal to 1 tCO_2 sequestered by the project. The VCS is a base-level-quality standard that aims to keep costs for validation and verification low while still ensuring basic quality requirements. The Kasigau Corridor REDD Project in Kenya was one of the first projects to be approved by the VCS in 2010 (visit http://www.vcsprojectdatabase.org/ for more details about the project or VCS in general).

According to the Ecosystem Marketplace and the World Bank documents (Linacre et al, 2011), Voluntary Carbon Standard had the biggest market share among all carbon standards in the voluntary market with 125 million tCO_2 traded in 2010 at the total value of $393.5 million.

Plan Vivo Standard

The Plan Vivo standard was developed for small-scale LULUCF (Land Use, Land Use Change and Forestry) projects with a focus on promoting sustainable development and improving rural livelihoods and ecosystems. It emphasizes participatory design, stakeholder consultation and the use of native species (Kolmuss et al. 2008). The standard has been used in projects based in Mexico, Mozambique and Uganda and helps them to receive a premium on offsets sold to European and US-based buyers. It applies to community-based agroforestry or forest conservation projects that yield significant socio-economic benefits in the local area.

Carbon Fix Standard

The Carbon Fix Standard focuses on certifying high quality forestry carbon offset offsets with biodiversity and sustainability benefits.

Other Standards

The Climate, Community & Biodiversity Standard (CCBS) is a project design standard with rules and guidance to ensure that carbon projects deliver local community and biodiversity benefits. It does not verify quantified carbon offsets nor does it provide a registry. The CCBS was developed by the Climate, Community and Biodiversity Alliance (CCBA)[12] with feedback and suggestions from independent experts.

The Greenhouse Gas (GHG) Protocol for Project Accounting and the ISO 14064 are GHG offset accounting protocols or tools for quantifying and reporting GHG emissions reductions from projects. They are independent standards for voluntary carbon projects and do not focus on verification, enforcement or co-benefits (Kollmuss et al. 2008). There are also offset standard screens that accept projects implemented under other standards. For example the Voluntary Offset Standard (VOS) accepts projects implemented under the CDM or Gold standard, but in locations that did not ratify the Kyoto Protocol (Kollmuss *et al.* 2008).

Exercise D

1. What is the role of standards in carbon markets?
2. List a few carbon standards that you know? Which are more difficult to obtain and why?
3. Why do you think that carbon producers try to certify their projects with more strict standards?

[12]CCBS is promoted by a group of five companies (BP, Intel, SC Johnson, Weyerhaeuser and GFA: Germany) and five NGOs (Conservation International, the Hamburg Institute of International Economics, Pelangi Indonesia, The Nature Conservancy and the Wildlife Conservation Society).

MODULE 5

Forestry in Carbon Offset Markets

Developing country producers of forestry carbon offsets must decide whether to generate offsets for the legislated or the voluntary market. In general, the requirements of the legislated market are more strict, though with the growing standardization and certification, voluntary markets too are building more stringent rules. Table 6 lists the most recent market data on sale of forest carbon offsets. It shows that the total volume of forest carbon offsets that were traded in 2010 were 30.1 million tCO_2 (Diaz et al 2011). Comparison of Tables 5 and 6 bring out some interesting facts: the global market for forest carbon offsets is less than 1% of the total trade in carbon offsets, both in terms of volume and the dollar value.

However, the trade in forest carbon offsets is not negligible, it is valued at $133.4 million, with more than 90% of this occurring through voluntary transactions. The major share of the forestry offsets comes from Latin America (16.9 million tCO_2), mainly due to a large number of forestry carbon projects in Peru and Brazil, followed by North America with 4.9 million tCO_2, and Asia with 3.7 million tCO_2. Africa's contribution is much lower at 1.9 million tCO_2 (Diaz et al, 2011).

Table 6: Status of Global Trade in Forest Carbon Offsets (2010)

	Volume (million tCO_2)	Value (million $)	Average Price ($/$tCO_2$)
Voluntary over the counter	27.4	126.7	5.6
CCX	0.1	0.2	1.2
Total Voluntary	27.6	126.9	5.6
CDM	1.4	6.3	4.5
Australian Scheme	1.1	0	Na
New Zealand Scheme	0	0.3	12.95
Total Legislated	2.6	6.5	4.6
Total Global	30.1	133.4	5.5

Source: Ecosystem Marketplace and Diaz et al 2011

(I) Legislated Markets

Legislated markets comprise a small proportion of the international trading in forest carbon offsets since many of them either exclude trading in forestry offsets or restrict the geographical area from where they can be sourced. The European Union Emission Trading Scheme (EU ETS) does not allow for trading in forestry carbon offsets. Under CDM, carbon sequestration projects through afforestation and reforestation (A/R) are allowed so long as they occur on previously (as on January 1, 1990) non-forested lands. The A/R project in Guangxi Watershed Management

in Pearl River Basin in China was the first carbon sequestration project registered under the CDM. It will generate 25,795 tCO_2 per annum by regenerating the local area. Overall, CDM projects traded 1.4 million tCO_2 in 2010 at an average price of \$4.5/tCO_2 which was less than the average price in voluntary markets. Another problem is the long lag in approval of projects by CDM Executive Board, which has been one of the major concerns regarding growth of CDM projects.

(II) Voluntary Markets

Because of the challenges in the legislated markets, forestry carbon offsets have mostly been transacted in the voluntary market, most importantly, the Chicago Climate Exchange (CCX) which allowed its member companies to purchase offsets from forestry projects in developing countries (Jindal *et al*, 2007b). From its inception in 2003 to 2008, the CCX traded 2.6 million tCO_2 worth \$7.9 million from forestry and land use change projects. Since then however, the market has plummeted after its trading program ended in December 2010.

The market segment that continues to show robust growth for forestry carbon offset projects is referred to as Over The Counter (OTC) sales. These sales take place through direct transactions between carbon buyers and sellers or producers. Due to diverse and disaggregated forms of this market, it is hard to determine its exact size. However, as per one reliable estimate, by 2008, the voluntary project-based transactions in carbon offsets from forestry and other land use projects was 15.3 million tCO_2 worth \$129.7 million (Hamilton *et al*, 2010b). There are now hundreds of active voluntary forestry-based carbon-offset projects operating in different parts of the world. Examples vary from large-scale forestry plantations set up by Green Resources Ltd. in several African countries, to Plan Vivo managed small community-based carbon sequestration projects in Mexico and Uganda (www.planvivo.org). Prices have ranged from a low of \$0.2 per tCO_2 to a high of \$10 – 15 per tCO_2. As we discussed before, there are several reasons for these differentiated prices – absence of a single voluntary market with a uniform price, concerns regarding the quality of carbon offsets, and existence of several different standards each associated with a different price tag. What this means in terms of earnings per hectare per year depends on the tree species and age of the stand. The low prices often limit the participation of small and marginal farmers in developing countries, as potential gains seem small.

Forestry projects can start out as voluntary initiatives and transform into legislated forms[13] as they expand and become more rigorous in their monitoring. For example, the International Small Group and Tree Planting Program (TIST) currently runs as a voluntary community based initiative in Kenya, Uganda, India and Tanzania (Jindal *et al*, 2007b), is in the process of being registered by the Clean Development Mechanism.

[13] In developing countries, companies do not buy carbon offsets on a large scale, but do support tree plantation and protection activities under their corporate social responsibility programs.

Challenges of selling voluntary forest carbon offsets

Although starting voluntary forestry carbon offsets projects is relatively easier than legislated ones, it is often hard to find buyers who are willing to pay for these offsets. Carbon project developers may need to cover all the upfront costs without any commitments from buyers. The following strategies are used to address the challenges of low price and uncertainty in attracting international buyers:

(I) Brokers and intermediaries

Brokers make carbon transactions happen between buyers and sellers, either at a fixed fee or as a certain percentage of the gross revenue. Thus, local land users are saved from having to look for and develop direct relationships with buyers. Sometimes brokers first buy the carbon offsets and then resell them to eventual buyers. Intermediaries train or help carbon producers in developing carbon projects and provide useful ancillary services such as third-party monitoring and verification of carbon contracts. Brokers sometimes also act as intermediaries such as EcoSecurities Ltd. Ecosystem Marketplace reports that more than 45% of the forestry credits contracted for sale in 2010 were to be bought by intermediaries for further sale to eventual buyers, mostly at a profit (Diaz *et al* 2011).

However, not all brokers have a profit motive. Many international organizations have adopted the mandate of helping developing country producers sell their carbon offsets in global markets. Prominent among these is Ecosystem Marketplace (www.ecosystemmarketplace.org) which works as an international clearing house of valuable information on trends in carbon markets as well as in other environmental services markets. It also coordinates a network known as Katoomba Group that runs training programs and workshops on how to design carbon offset projects and sell them in different markets. Through its incubator project, the group has built the capacity of many small NGOs that are interested in running community-based carbon offset projects.

Table 7. Examples of Carbon Brokers

Broker	Carbon offset Project	Transaction	Buyers
TIST*	Small-scale tree planting	Buys carbon offsets from individual farmers & sells	International investors
Scolel Te Project **	Forestry and agroforestry in Mexico	Generates & sells	World Economic Forum; Pink Floyd; Future Forests
Green Resources Ltd.	Tree plantations in Uganda, Mozambique, Tanzania & South Sudan	Generates & sells	Other companies investing on a voluntary basis
FONAFIFO***	Local landowners in Costa Rica	Buys bundled ES, unbundles & sells	National & international buyers

ES – Environmental Services

*Sources: * ENDS Carbon Offsets; **Tipper (2002); ***Jindal and Kerr (2007)*

(II) Collaboration with international organizations

Partnering with well-known international organizations that have a mandate to promote environmentally beneficial projects helps establish credibility and raise funds to cover upfront costs of project development. For example, Conservation International (CI) is partnering with local government and non-government organizations in Madagascar to generate carbon finance for forest conservation and expansion. Similarly, in Mamberamo Basin in Indonesia, CI is saving local forests from deforestation and conversion to palm oil plantations. CI has many other such projects based in Colombia, Philippines, China, Peru, and Ecuador .

Often partnerships with these international organizations are based on achieving co-benefits that contribute to their core agenda. Thus, World Wide Fund (WWF) collaborates on projects that conserve wildlife and promote biodiversity conservation while Plan Vivo focuses on community based projects that provide economic benefits to local poor. Such collaboration can be originated by the international organization or by the local organizations. Carbon funds managed by the World Bank are also another means of accessing carbon finance or markets. These funds comprise the World Bank Prototype Fund, Biocarbon Fund, Community Development Carbon Fund, and Forest Carbon Partnership Facility (http://wbcarbonfinance.org/).

Many of these funds help developing countries to formulate country level climate change mitigation and adaptation strategies through consultations with relevant stakeholder groups. Individual carbon projects then become part of a countrywide plan rather than stand alone efforts. This has become particularly relevant in the case of REDD activities where countries need to ensure that enhancement of forest carbon stocks in one part of the country is not impeded by forest loss in another part.

Exercise E

1. Why is it difficult to sell forest carbon offsets in international markets?
2. What are some of the ways that can help producers find international buyers for forest carbon offsets?

[14]Within Vietnam there exist several important areas with rich biodiversity and conservation values. For example, in Bac Kan province, Ba Be and Kim Hy National Parks.

MODULE 6

Reducing Emissions From Deforestation and Forest Degradation (REDD+)

Effective management of existing forests and other activities related to sustainable forest management were excluded from the first commitment period (2008-2012) agreed under UNFCCC's Kyoto Protocol. This was an important gap in the Protocol considering that 17% of the global carbon emissions come from deforestation and forest degradation in the tropics. The situation was rectified in 2007 in Bali where reducing emissions from deforestation and forest degradation (REDD) was accepted as one of the key strategies to mitigate global warming. The basic concept is that governments, companies or forest owners in the South should be rewarded for keeping their forests instead of cutting them down. Since then, rapid progress has been made in several countries on conserving primary forests and combining them with forest enrichment and protection. Many projects protecting existing forests in combination with forest enrichment to counter forest degradation are called REDD+ projects. Reducing Emissions from All Land Uses (REALU), sometimes also referred to as REDD++, is an initiative that further combines this with afforestation and reforestation on barren lands or forest margins to design conservation activities using a landscape approach. In general, REDD+ mechanisms provide the scope for a wide range of measures that include sustainable management of forests, stabilizing and safeguarding existing forest carbon stocks, and expanding carbon sinks through reforestation activities on forest margins.

REDD projects need to ensure that mitigation results can be measured, reported and verified (MRV). This implies that emission reductions through REDD need to be accounted for against a long-term baseline (reference scenario) of emission levels without REDD project interventions. REDD standards are being developed to ensure quality of offsets generated. Most big projects are taken up in partnership or under the leadership of the host country governments though many small and community based REDD projects have also been implemented. Many carbon markets are yet to trade in REDD offsets, awaiting the next round of legislation (or any climate treaty) after the 2012 Kyoto Protocol cycle. Even then REDD projects are growing in many parts of the world and now constitute the single largest share of the voluntary trade in forest carbon offsets, accounting for more than 40% of the voluntary transactions in 2010 (Diaz et al 2011). In addition, industrialized countries have committed $4 billion towards REDD activities during 2010 to 2012 in form of three large global funds targeting a set of countries. The funds are mainly aimed at building capacity for developing nations to implement, account for and be able to trade in emission reductions from REDD.

(i) United Nations REDD program (UN-REDD)

The UN-REDD program ($50 million) was started by the United Nations Development Program (UNDP), the United Nations Environment Program (UNEP), and the Food and Agriculture Organization (FAO). The program covers a total of 29 countries in Africa, Asia, and Latin America. It builds capacities of partner countries in planning national level REDD+ strategies that combine local priorities with the objective of reducing deforestation and forest degradation.

Important thrust areas include developing effective monitoring, reporting, and verification methods as well as ways to implement fair benefit distribution mechanism from conservation of forests (Intergovernmental Taskforce, 2010).

(ii) Forest Carbon Partnership Facility (FCPF)

Similar to the UN-REDD program, the Forest Carbon Partnership Facility (FCPF) helps 37 developing countries (14 in Africa, 15 in Latin America and the Caribbean, and 8 in Asia and the Pacific) with planning and implementing effective REDD+ programs that are aligned with UNFCCC discussions. The fund ($345 million) is administered by the World Bank and has two components–the Readiness Fund ($200 million) and the Carbon Fund ($145 million). The Readiness Fund helps countries develop their own REDD+ readiness plans so that they can receive financial incentives for carbon offsets generated through REDD+ activities. This includes developing reference emission levels, strategies to implement REDD+ activities, effective monitoring systems, and performance based payment systems. The Carbon Fund will provide the actual payments for verified emission reductions or carbon offsets generated by REDD+ activities.

(iii) Forest Investment Program (FIP)

The Forest Investment Program (FIP) is another large multilateral fund ($348.5 million pledged) implemented under the joint partnership of the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, the Inter-American Development Bank and the World Bank Group. Similar to the other two funds, FIP assists developing countries in reducing deforestation through sustainable forest management activities. FIP will provide upfront financial and technical assistance to host countries for developing effective REDD+ strategies that combine forest conservation with livelihood promotion. This includes addressing drivers of deforestation even if they exist outside the forest sector.

In addition to global funds, there are REDD initiatives by governments. For example, the Norwegian government has committed US$600 million a year to support REDD activities. There are additional sources of bilateral funds such as Germany's International Climate Initiative, Australia's International Forest Carbon Initiative, and the International Climate Fund managed by the Government of UK (for more details, see www.climatefundsupdate.org).

There are also private sector REDD projects such as the Ulu Masen project in Sumatra funded by Merrill Lynch. Similarly, the Macquarie Group and Flora and Fauna International have forged an international collaboration to identify and fund REDD projects around the world.

Exercise F

1. How do REDD projects differ from carbon sequestration projects?
2. What distinguishes REDD from REDD+ and from REALU?
3. How justified are the concerns about forest carbon projects? What can be done to improve the acceptance and pricing of forest carbon credits?

Conclusion

This Lecture Note set out to explain the nature of the carbon market, its various segments, and possible strategies for developing country producers to access these market segments. Starting with how cap and trade system works to how project based emission reductions can be incorporated in the same system, we saw how in spite of the rapid growth of the legislated market, the sale of forestry carbon offsets remains low. Although the Clean Development Mechanism has shown signs of picking speed, there are uncertainties regarding its continuation after the end of the present commitment period in 2012. Indeed, to date the voluntary market, especially the project-based transactions or over the counter sales offer the best scope and are worth millions of dollars.

The three most common ways in which developing country producers have tried to access this voluntary market and attract price premiums on their offsets are by using brokers or intermediaries, collaborating with international organizations, and by applying for international carbon standards or certifications. In many cases, these strategies have helped projects in improving their profile resulting in carbon sales. However, project developers still need to be cognizant of the initial costs that they may need to bear when setting up new projects.

Finally, in order for developing country producers to have a quick understanding of the various segments of the carbon market, we have listed useful sources of information in appendix 1, and outlined a flow diagram in appendix 2. It shows how project developers first need to decide whether they are targeting legislated or voluntary markets (though once the project is established, the two can be explored together). CDM is the biggest component of the legislated market and requires submission of a project note, which is submitted to the Designated National Authority in the host country and then to the CDM Executive Board for its approval before the carbon offsets can be sold. In case of voluntary markets, the project can be initiated at any stage and there is flexibility in how the sales are made. Brokers, partnerships with international organizations, and standards or certifications further aid in this process to make sales of carbon offsets. In case of REDD+ activities where governments wish to access multilateral funds, they first need to submit a project idea note followed by developing country level strategies. Once the project note and the detailed country strategy in terms of the project detailed document is finalized and agreed upon, host countries can start generating offsets for sale.

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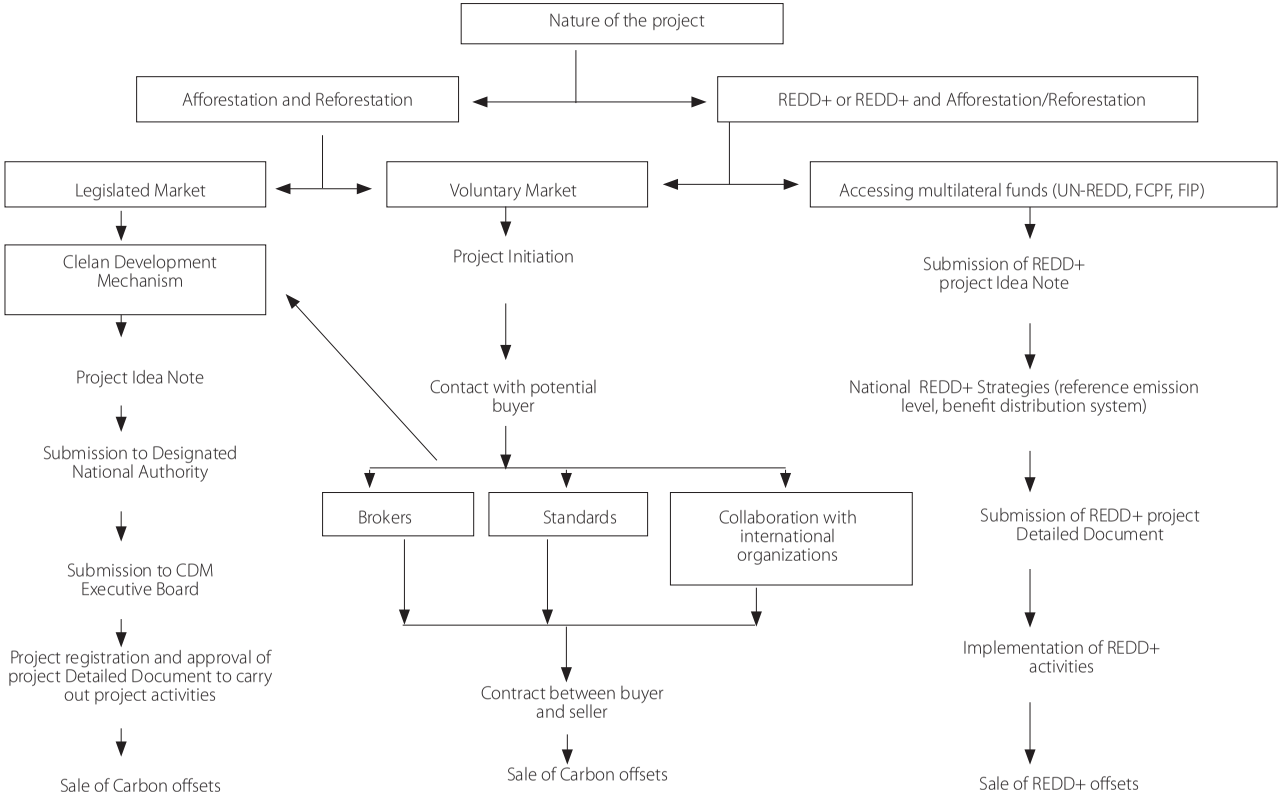
Appendix 1
Sources for more information

CCBS	http://www.climate-standards.org/standards/index.html
Chicago Climate Exchange	http://www.chicagoclimatex.com/
Clean Development Mechanism	http://cdm.unfccc.int/
Ecosystem Marketplace	http://www.ecosystemmarketplace.com/
Forest Carbon Partnership Facility	http://www.forestcarbonpartnership.org/fcp/
Gold Standard	http://www.cdmgoldstandard.org/
Plan Vivo	http://www.planvivo.org/
Point Carbon	http://www.pointcarbon.com/
UN-REDD	http://www.un-redd.org/
Voluntary Carbon Standard	http://www.v-c-s.org/
World Bank Carbon Finance	http://wbcarbonfinance.org/

Appendix 2

Flow Diagram to help explore Markets for Forestry Carbon Offsets from Developing Country Producers



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