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WHY DOES PAKISTAN REQUIRE A MORE CRITICAL APPROACH TO THE CLEAN DEVELOPMENT MECHANISM?

Abstract

Clean Development is intended to tackle the dumping of greenhouse gases in the atmosphere that has accompanied fossil fuel driven development in both countries of the North and the South. Per capita GHG emissions are much higher in the North than the South and mitigation efforts based on carbon trading are expected to provide the main approach to addressing the climate crisis globally. CDM is presented as the South's contribution to global climate change efforts but is tied into and serves the Cap and Trade approach of the North. In this paper Pakistan's contribution to CDM is critically examined at the time of the completion of the first commitment period under the Kyoto protocol.

Introduction

The Clean Development Mechanism is a product of the Kyoto Protocol (1997) which is the only global agreement concerned with efforts to mitigate GHG emissions and stabilize the Earth's climate. This effort to address the drivers of climate change is the consequence of the efforts of the Intergovernmental Panel on Climate Change (IPCC) resulting in a series of Assessment Reports of which the Fifth Assessment Report is due next year in 2014. These IPCC reports have helped establish a consensus among scientists that anthropogenic global warming is the driver of present day climate instability that is commonly called global warming.

Ever since the Brundtland Report (1987) there has been a global awareness that the development model followed in the North has not been a sustainable paradigm of development because of its damaging environmental impacts. Hence the need for Sustainable Development both for the North and the South, perhaps even more so now that the South aspires to a catch-up development which will threaten the stability of the global ecosystem. This has been highlighted by the crossing of a number of planetary boundaries in a study by Rockstrom et al (2009). In their study of planetary boundaries the baseline year in all boundaries is taken from the time of the industrial revolution. How can sustainable development break with the (capitalist) industrial development model and ensure a safe operating space for the global environment? This is the basic question both behind the need for Sustainable Development and Clean Development.

In the context of the present day climate instability the concept of Sustainable Development has been replaced by a focus on climate change with Sustainable

Development metamorphing into Clean Development. The term Clean Development can be contrasted with the fossil fuel dependent development that has provided the basis for industrial development since the birth of industrial capitalism (Huber, 2009). Fossil fuels have traditionally been characterized with dirty development and the environmental degradation related to the extraction, production and consumption of fossil fuel energy. Now even the relatively cleaner sources of fossil fuel energy are seen as sources of environmental pollution in the form of green house gas emissions. Clean Development is now given a new meaning in the form of a development which breaks with the conventional energy intensive development paradigm. This clean development paradigm is now redefined as a low carbon development and the replacement of fossil fuel energy with renewable energy is the obvious preferred direction.

The origins of present –day climate instability

The origin of present day climate instability is now traced back to the period of intensive fossil fuel consumption starting at the time of the industrial revolution. The products of industrial production, mainly the greenhouse gas carbon dioxide and other industrial green house gases have been dumped in the atmosphere for over 200 years without understanding the unintended consequences of the overuse of this dump. The unintended consequences of the use of industrial products and the dumping of industrial wastes is the distinguishing feature of much environmental science where these unanticipated processes have consequences in the larger environment and where the processes are studied and understood only subsequent to their environmental impact. Chemical pesticides, the depletion of the ozone layer, climate change, loss of biodiversity are all examples where the need for the precautionary principle comes from the fact that lessons are learnt late in spite of the early warnings (Harremoes, 2001). Climate instability is a consequence of the overuse of the atmosphere as a dump for the products of fossil fuel consumption. The atmosphere has the ability to recycle this fossil carbon through the availability of a terrestrial (biotic) sink and an oceanic sink which can keep carbon dioxide within limits if a threshold concentration of CO_2 is not exceeded. Climate instability takes place when this threshold has been crossed and non linear feedback processes accelerate global warming.

Not only has this recycling capacity of the atmosphere been overused by the countries of the North which have been using the atmosphere as a dump for over 200 years but this dump has been used in a very skewed manner such that countries of the North have overused the dump whereas countries in the South have not used the dump significantly in the past 200 years and continue to use the dump less in terms of current carbon emissions per capita compared to the North. As a result many authors have stressed the fact that the North owes the South a significant climate debt (Khor (2009), Agarwal & Narain (1991) which should be reflected in carbon reparations from the countries of the North to countries of the South. How does Kyoto reflect this overuse and skewed use of the atmosphere as a dump?

Kyoto: Common but Differentiated responsibility

The Kyoto Protocol apparently reflects the reality of the overuse and skewed use of the atmosphere as a dump through the principle of Common but Differentiated responsibility. Differentiated responsibility recognizes the historical overuse of the dump by the North and its historical underuse by the South. As a result the Kyoto Protocol imposes mandatory emission reductions on countries of the North while allowing countries of the South follow their development goals without any requirement of carbon emission reductions. In fact it recognizes that development will necessary lead to increased carbon emissions. The need for a development space for the countries of the South means a need for a climate space as well. The common responsibility of the North and the South is to move towards a break with the fossil fuel intensive model of development which means adopting a low carbon development model which is now called Clean Development.

In order to comply with the Kyoto Protocol countries of the North are required to reduce their 1990 carbon emission levels by an average of 5% in the first commitment period 2008-12. The Kyoto Protocol is presented as a first step in carbon emission reductions. The IPCC has characterised the necessary reductions to stabilize the climate as a 75-80% reduction by the year 2050. Kyoto is a small first step (5%) of a much longer road (75%). How are these subsequent steps envisaged in the Kyoto Protocol? How can a 75% cap on carbon emissions be achieved?

The Kyoto Protocol has two prongs in its approach to climate mitigation (Lohmann, 2005). One prong is based on emissions trading and is called the Cap and Trade approach and involves mandatory emission reductions for those countries in the North acceding to the Kyoto Protocol. The second prong is the Climate Development Mechanism (CDM) enabling a contribution to climate mitigation for countries in the South outside the cap region. The first prong Cap & Trade requires a ratcheting down of the emission cap from 5% in the first commitment period through a series of emission caps eventually to meet a target of a 75% emission cap by around the year 2050. The Cap & Trade mechanism is based on carbon trading which involves the creation of a new carbon commodity and some kind of property rights that are associated with all commodities. The second prong of the Kyoto Protocol is the CDM. The CDM was originally envisaged as a Carbon Development Fund created out of the penalties that a cap on carbon emissions would require and would contribute to the climate reparations due from the North to the South. The CDM actually emerged as a mechanism for enterprises in the South to earn carbon credits through engaging in carbon offset projects. In this way a climate development fund was transformed into a mechanism for helping the North achieve its compliance requirements under the Kyoto Protocol and tied into carbon trading and the future of cap and trade in the North.

Cap & Trade; Privatisation of the Atmosphere

How can the atmosphere be privatized? How can a carbon commodity be created? How does emission trading work?

Consider two factories, A and B, which are emitting carbon dioxide during their production processes. The two factories are provided carbon emission allowances based on their 1990 emission levels. The emission allowances are a percentage reduction of their 1990 emission levels. Factory A is unable to meet its emission requirements (cap) and has excess emissions over its allowances. Factory B is able to achieve its required emission reductions and is able to exceed its emission reduction requirements and emits below the required cap. In our example the magnitude of surplus emissions of factory A and the excess emission reductions of factory B are the same. Factory B can then sell its emission credits to Factory A which through purchase of surplus emission allowances can meet its emission target (the cap). If emission credits are easily available the price of emission credits will be small and factory B will have a small incentive to reduce emissions below the cap and factory A will buy emission credits to attain the emission cap and avoid more severe penalties. If the emission caps are tight there will be a scarcity of emission credits and emission permits will have a high price. Slowly ratcheting down the cap will ensure that the pressure to reduce emissions is kept up but will not threaten the survival of the industry. Fast ratcheting down of the emission cap can threaten the viability of some industries. Thus relations of power will influence the speed of cap reductions. Emission allowances can be grandfathered or auctioned. Under grandfathering the factory A is provided an emission allowance for 95% of its 1990 level emission and will have to purchase any surplus emissions. Factory B is able to reduce its current emissions below its cap requirement and can sell its surplus carbon emission credits. It also obtains 95% of its 1990 level emissions free of cost. In this way Cap and Trade is biased in favour of the large polluters (SandBag, 2011). They only pay for excess emissions over the cap level. Cap & Trade can allow some factories to make windfall profits in carbon trading in this manner. Cap and trade can contribute to Capital Accumulation by Decarbonisation (Bumpus, 2008) and the carbon market has become a new financial market.

Carbon Offsets and Certified Emission Reductions

How can carbon emissions in the North be offset by emission reductions in the South? In the above example of Cap and Trade both factory A and factory B are located in the North where a mandatory emission cap exists in order to comply with the Kyoto Protocol. Carbon offsets are projects located in the South where no mandatory emission cap exists and as described above countries in the South have been granted Development space and Climate space. Factory A in the North is unable to meet its emission cap requirement and has surplus emissions for which it must buy emission allowances to meet its emission targets. In this example Company C is engaged in installing and running wind energy turbines in the South. These wind energy projects are not financially viable as the electricity they produce cannot compete cost wise with the alternative fossil fuel based electricity. However increased installation of wind energy turbines displaces conventional fossil fuel energy production and offsets the carbon emissions that would otherwise be produced. This offset of carbon emissions enables Certified Emission Reductions (CERs) to be issued to Company C by the Executive Board of the UN Clean Development Mechanism. If the price of CERs in the Carbon Market is sufficiently

high Company C will be able to sell the electricity it produces through renewable wind energy at a price below cost due to the additional revenue generated by CDM finance generated by sale of CERs and compete with fossil fuel based electricity generation. Carbon offset projects are thus intended to enable transfer of technology of cleaner energy production to the South and enable factories in the North achieve mandatory emission reduction at cheaper cost. This flexible mechanism enables some factories in the North like factory A achieve its emission reduction targets at cheaper cost by investing in carbon offset projects in the South. It appears to be a win-win solution encouraging Clean Development in the South and meeting the compliance requirements of Kyoto in the North.

Internalising Externalities: Pricing environmental services to save the environment?

As described above the climate instability has been created by the overuse of the atmosphere as a carbon dump by countries of the Global North. The atmosphere has the ability to recycle the carbon dumped there through carbon sinks like the ocean and terrestrial forests as long as the amount dumped remains within certain thresholds. When the dump is overused the stable climate system becomes unstable and regulation of the dump becomes necessary for stabilizing the global climate. How the dump is to be used in an unequal world divided into a wealthy Global North and a poor and populous Global South is a question of political power and the inequalities reproduced by this division. The global processes of production enable some people to sustain their livelihoods and also enable the processes of capital accumulation. The global ecosystem provides many shared resources like air, water, sunlight and soil which sustain the conditions of production. How can the global ecosystem be regulated to ensure this sustainability. In the present era of neoliberalism this sustainability is driven by processes such as the enclosure of the atmosphere, the enclosure of water, the enclosure of land and labour. The threats to ecosystem sustainability are thus met by making payments for ecosystem services (PES) which will help ensure the "polluter pays principle" whereby previously externalized costs are now internalized. The benefits of this commodification of nature will trickle down to those people who sustain the ecosystem in the process of earning their livelihood.

The process of putting a price on carbon involves privatizing the atmosphere where the recycling ability of the atmosphere is the commodity. How can this recycling capacity of the atmosphere be framed as a commodity and how can the agents be framed? As Michel Callon (1998) has explained all commodities are created through this framing process involving a process of disentanglement and re-entanglement. In the case of the atmosphere the framed property of the atmosphere is the green house gas effect. Green house gases are framed as naturally occurring GHGs and anthropogenic GHGs and agents responsible for anthropogenic GHGs emissions and sequestration have to be framed. Each process of framing involves overflows which relate to processes that do not fit into the present frame and require new framings. This process of framing is never complete (Callon, 2009).

In creating the carbon commodity greenhouse gas accounting is required to establish a baseline from which emissions can be added or subtracted. The subtraction of carbon emissions from the baseline is the process of climate mitigation whereas addition of carbon emissions over and above the baseline is the process of carbon accumulation. The price of carbon is an incentive to mitigate the climate and a penalty for contributing to the accumulation of emissions. As a result the determination of the baseline involves the allocation of emission rights with the historical large polluters gaining the most pollution rights. Rather than the "polluters pay principle" we have the principle of the largest polluters have the most benefits.

Just like the process of framing is never complete and economic calculations are always incomplete, similarly the transformation of externalised costs into internalized costs can never be complete and involve the creation of new metrics and processes of commensuration (Lohmann, 2012).

The Contradictions of Carbon Trading

Access to the atmosphere as a carbon dump is now being regulated through the process of carbon commodification. What are the contradictions of this process of commodification?

1) Not all countries have carbon emission caps

As a result of the overuse of the carbon dump in the atmosphere by countries of the Global North it was not possible to impose mandatory emission reductions uniformly across the globe. The historical overuse by the North and underuse by the South resulted in compulsory emission reductions for countries of the North (i.e. those acceding to Kyoto). As a result emission caps in the North can also be met by shifting production from capped areas to uncapped areas. In particular industrial gas destruction projects which involve greenhouse gases with large global warming potentials (GWP) have been used to game the CDM market. In other words shifts in production have enable companies to gain windfall profits without any global reduction in GHGs emissions. Production has shifted from the North to the South in order to benefit from CERs created by the destruction of industrial gas byproducts of refrigerants such as CFC-23 and the destruction of Nitrous Oxide in CDM adipic acid projects.

As a result there is increasing pressure on large carbon polluters like China to commit to mandatory emission reductions inspite of the significant difference in accumulated historical emissions of countries like China, Brazil and India compared with countries in the Global North. The issue of climate reparations for the historical overuse of the atmosphere is thereby sidelined by focusing on levels of current emissions. CDM legitimizes the past inequities and replaces the issue of climate reparations by the opportunity for the South to earn carbon offset credits as a contribution to climate mitigation.

2) Emission caps are based on identifying countries as the appropriate unit of analysis.

Under the mandatory emission caps of the Kyoto Protocol countries are required to meet different cap levels compared to the baseline emissions of year 1990. The underlying assumption is that the agent responsible for carbon emissions can be identified according to the location of the production process leading to carbon emissions. The consumers of the products of various production processes are not framed as responsible for the carbon emissions embodied in the product during its production phase or disposal phase but only those emissions occurring during the consumption phase of the product. As a result although China is emerging as the factory of the world the carbon emissions of China's export industries are framed as the emissions of China rather than the emissions of those countries which are the destination of the products. This is an area of contestation by the Chinese government i.e. the products of Chinese export industries are destined for consumption in the Global North but the responsibility of carbon emissions is categorised according to the country of production rather than the country of consumption. Much of production in the South is driven by the consumption needs of the North and attributing carbon emissions according to the location of production reinforces the existing Global North-South divide.

3) Carbon trading involves the creation of property rights

Carbon Trading involves the creation of a carbon commodity. How does the carbon commodity differ from more conventional commodities? Property rights exist in a variety of forms involving both physical property and intellectual property. Three aspects are worth mentioning here.

a) Framing the agents responsible for carbon emissions is an area of contestation. In paying for surplus emissions above the emission cap an enterprise has been given rights to emissions below the mandatory cap. These property rights have been allocated to the large polluters whereas the small polluters or non-polluters are not granted any rights to carbon emissions. The creation of property rights in carbon trading is a property of carbon trading that is carefully kept from view to hide the inequities involved.

b) The nature of the carbon commodity is a tradeable emission allowance. How is the quality of a commodity ensured? Conventionally commodity trading involves a process of standards and certifications that are established within a particular industry either through self regulation or state regulations. In the case of carbon emissions the buyer of emission allowances is not concerned with the quality of the certified emission reductions (CERs) but only with certification from a recognized authority. The seller of emission allowances is similarly concerned with the certification process and not any independent evaluation of carbon offsetting. When both buyer and seller are not concerned with the quality of the carbon commodity but only with its recognition by an appropriate

authority the integrity of the carbon market can be vulnerable to collapse like the financial markets in 2008. This is the reason why CFC-23 destruction projects in a decision made by the Executive Board of the CDM in 2012 now have more limited ability to generate CERs.

c) How are emission rights allocated in the mandatory cap regions in the North?

Emission rights can either be auctioned or grandfathered. Auctioning emission rights means that there is a competition between different buyers for the emission rights and the highest bidder is allocated the emission rights. The government then provides a license to the highest bidder and in return generates government revenues from the auction. In grandfathering emission rights the rights are allocated according to historical emission levels by different enterprises. As the large polluters are also the economically and politically powerful elements within society this ensures their willingness to accept the pricing of carbon as a necessary step and makes climate mitigation less threatening to their economic interests. In fact a process of decarbonisation can proceed without threat to the process of capital accumulation, Bumpus (2008). Climate mitigation can be a profitable business.

4) How fast can the emission cap be ratcheted down?

The Kyoto Protocol involves a ratcheting down of emission levels by 5% from the 1990 baseline by the year 2012 within the Annex-1 countries of the Kyoto Protocol. In order to stabilize the climate with a 2 degree C limit on global warming the IPCC has argued for a 75% reduction in global emissions by the year 2050. The difference between a 5% reduction in the North by 2012 and a global reduction of 75% by 2050 is enormous. Particularly if the reduction in climate space used by the North is accompanied by an enlarged climate space for countries in the South, the speed of emission cap reduction for the North needed to stabilize the climate is going to have to be a fast cap reduction with significant structural changes towards a low carbon economy. In comparison the present slow ratcheting down of the emission cap is a marginal change accompanied by the entrenchment of property rights which has made this step politically feasible.

As a result of these contradictions within the dominant carbon trading approach to climate mitigation the future of cap and trade appears uncertain. Carbon offsetting projects in the South are intended to help the North achieve their mandatory emission reduction targets at least cost and so are likely to prolong the fossil fuel based growth in the North rather than breaking with this high carbon development model. For Pakistan to hitch its clean development future to the Clean Development Mechanism (CDM) in view of the structural link between CDM and carbon emission trading is like entering a road of uncertain destination.

Carbon Offset projects in Pakistan

In 2012 Pakistan has 52 CDM projects in the pipeline with an estimated annual CERs of 6778 kCERs. (Each kCER produces the equivalent of 1000 tonnes of carbon dioxide equivalent emissions). Carbon Offset Projects in Pakistan can be categorized into five categories.

1) Industrial gas destruction projects

These projects involve industrial gases which are green house gases with large global warming potentials and the destruction of these gases which are frequently byproducts of industrial products can contribute to significant carbon emission offsetting and CERs because of their very large GWP. In the case of HFC-23(GWP= 11,700) the destruction of this gas can generate more revenue than the sale of the industrial product itself and has created perverse incentives and resulted in the gaming of the CDM. The most well known examples of these gases are nitrous oxide (GWP=300) a byproduct of nylon production and nitrogen fertilizers and HFC-23 a byproduct of the refrigerant HFC-22.

Pakistan has two CDM projects involving the destruction of nitrous oxide resulting from plants producing nitric acid needed for fertilizer production. The two projects are expected to generate around 1508 k CERs annually.

2) Renewable Energy projects

Renewable energy projects in Pakistan consist of four hydroelectric power projects and three wind energy projects. Renewable energy projects do not emit any greenhouse gases during their operation and thus do not entail any direct carbon emissions and only entail indirect carbon emissions. For example wind energy projects are responsible for the carbon emissions due to carbon embodied in the wind turbine production and any deforestation involved in creating the wind corridors. Hydroelectric projects similarly entail embodied carbon in the machinery and cement used and indirect emissions due to methane emissions from flooded vegetation resulting from the dam construction. Some of these indirect emissions are included in the project boundary and leakages and others are not.

These seven renewable energy projects are expected to generate 2292 kCERs annually. Large hydroelectric projects are capital intensive projects and have a long gestation period and as a result their additionality is questionable. Such projects are likely to proceed without CDM finance generated by the sale of CERs and are thus likely to be Business as Usual (BAU) projects which do not fulfil the additionality criteria for CDM projects.

3) Fuel switch projects (Biomass projects)

Fuel switch projects are projects which switch from fossil fuels with high emission factors (like coal or oil) to fossil fuels with low emission factors (like natural gas).

However as domestic natural gas (when available) is cheaper than imported oil these projects are BAU projects and are not entitled to CDM status. In Pakistan the only fuel switch projects which have CDM status are fuel switches to biomass based fuels which are assumed to have low emission factors. In fact under the carbon neutrality assumption biomass derived fuels are assumed to have an emission factor of zero. This means that any carbon dioxide emissions from biomass burning are assumed to be part of the biotic carbon cycle which is in an assumed equilibrium where emissions from burning biomass are exactly balanced by subsequent sequestration of carbon dioxide by photosynthesis and the regeneration of biomass.

The biomass projects in Pakistan are based on crop residues mainly from rice husk in the textile industry and from Refuse Derived Fuel (RDF) and Tire Derived Fuel (TDF) in the cement industry.

A total of about 712 kCERs are expected to be generated annually from these nine projects with most kCERs coming from the four cement industry projects (584 kCERs) and a smaller amount from the textile and rice processing industry(128 kCERs).

4) Energy Efficiency projects

The largest number of CDM projects in Pakistan are in the category of energy efficiency projects. In this category 29 projects annually are expected to generate 1820 kCERs. These projects include waste heat recovery projects which would not be profitable without the incentive of additional CDM finance generated through the sale of CERs. Bagasse energy projects which involve the burning of bagasse at higher temperatures and pressure which produce as a result more energy per unit of bagasse burnt. Conventionally bagasse is burnt in a sugar mill to produce energy needed for processing sugar without the need of imported energy. These CDM bagasse projects are thus energy efficiency projects which can produce both thermal energy and additional electricity and are called cogeneration projects. One of the contradictions of these bagasse projects is the combustion of bagasse is assumed to be carbon neutral and hence does not lead to an increase in carbon dioxide emissions in the atmosphere . However the more efficient burning of this biomass is claimed to reduce carbon emissions. The more efficient burning of a fuel with non-zero emission factor will lead to less emission however the more efficient burning of biomass with zero emission factor appears paradoxical. The argument given is that the extra biomass generated electricity will displace the import of energy from the electricity grid.

Other projects within this category of energy efficiency projects within Pakistan are the production and distribution of energy efficient stoves to replace the traditional stoves used in rural areas without access to natural gas. These projects involve the distribution of a large number of improved stoves each with less carbon emissions compared to traditionally used stoves. The nature of these CDM projects are different from the majority of CDM projects which are projects of an industrial character with point source emissions. Point source emissions in principle can be

monitored more accurately while the emission reduction calculations of distributed emission sources need to rely on statistical models with larger uncertainties. The significance of these projects is the combination of improved people's livelihoods (sustainable development aspects) with climate mitigation. The climate mitigation contribution is marginal.

5) Waste management projects

The waste management projects in Pakistan are five in number with estimated annual emission reductions of 446 kCERs. These projects can also be called methane avoidance projects as they are all based on avoiding methane emissions (GWP=21) and replacing methane emissions by carbon dioxide emissions(GWP=1). This replacement of a greenhouse gas with higher GWP by a greenhouse gas with lower GWP results in a reduction in carbon emissions which is measured in terms of carbon dioxide equivalent (CO_2e). Most of these projects are Solid Waste Management (SWM) projects which replace anaerobic decay processes by alternative processes. We have including the one gas flaring project in Pakistan in this category of methane avoidance.

Pakistan's share of the global CDM distribution

The global distribution of CDM projects in the developing world is very skewed. In 2012 three countries China (51%), India (18%) and Brazil (5%) between them share 74% of the global distribution of CDM projects measured in terms of annual CERs expected to be generated each year. The rest of the developing world comprising of more than 100 countries has a share of 26% of the global distribution. The total annual estimated certified emission reductions are 1,190 MtCERs (Million tonnes of certified emission reductions in units of carbon dioxide equivalents). China's share alone is more than half at 605 MtCERs while India follows at 220 MtCERs and Brazil comes third at 55 MtCERs. The rest of the developing world (RoDW) has an annual estimated certified emission reductions of 309 MtCERs. Pakistan with 6.8 MtCERs has a share of about 2% of the rest of the developed world in terms of annual estimated CERs.

Figure 1: Skewed character of CDM globally

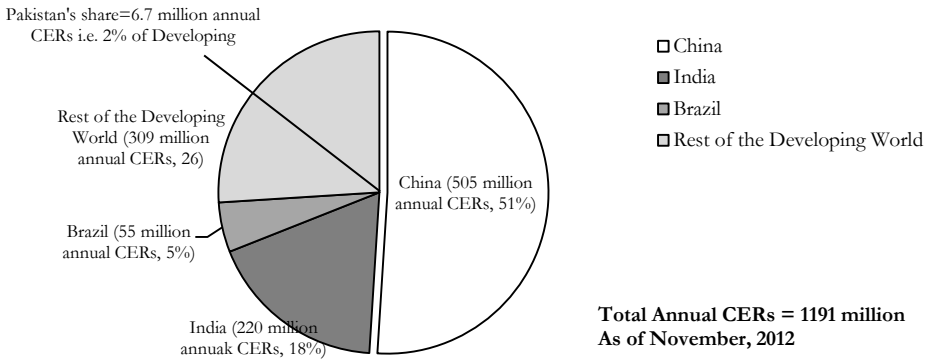
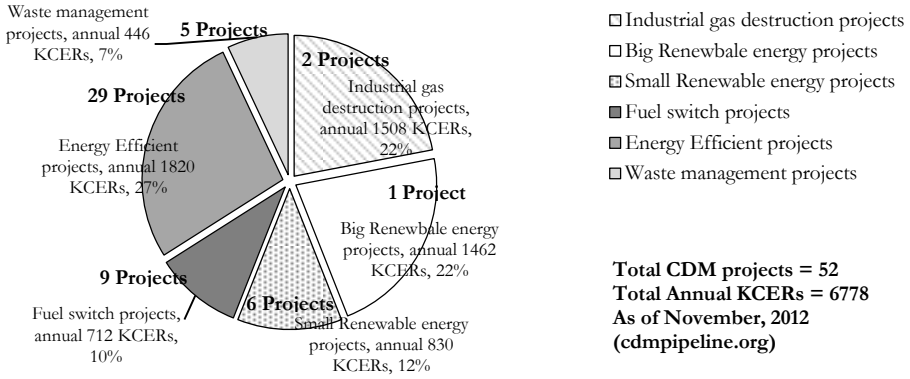


Figure 2: Skewed character of CDM in Pakistan



Pakistan's share of the global distribution of CDM projects is a very small share of less than 0.6% in terms of annual CERs expected. If the world is divided up into big, intermediate and small players according to the number of CDM projects in the pipeline. The big players with more than 400 projects in the pipeline are China, India and Brazil. The intermediate players with less than 400 projects in the pipeline include Mexico and Chile from South America and Vietnam, Thailand, Malaysia, Indonesia, and South Korea from Asia. The small players with less than 100 projects include South Africa (71), Phillipines (90) and Pakistan (52).

Two aspects of this global distribution of CDM projects deserve attention. One is the very skewed nature of this distribution with three quarters of the estimated annual emission reductions located in the three countries China, India and Brazil. These countries which are attracting the largest share of CDM investments are likely to persist in being the most attractive destinations for CDM finance and the cheapest way in which the mandatory emission reduction targets of the countries of the North can be met outside their own boundaries by efforts in countries of the Global South. The second aspect is that many countries of the Global South are being marginalised further in that they are not receiving any reparations from countries of the Global North (in view of their historical exploitation of the atmosphere as a carbon dump) and they are not able to earn CERs from the CDM in any significant manner compared to the leading players. Pakistan is part of this large camp of small players in the CDM global distribution.

Skewed distribution of CDM projects within Pakistan

The distribution of CDM projects within Pakistan can be evaluated according to the size of the projects. A total of 52 projects are in the pipeline which are expected to generate annually about 6778 kCERs annually. This gives an average size of each project as 130 kCERs in annual carbon offsetting. However there are three projects which are expected to offset 2970 kCERs while the remaining 49 projects generate a total of 3808 kCERs. The three large projects have an average size of 990 kCERs

while the remaining 49 projects generate on average only 78 kCERs for each project. Thus Pakistan also exhibits a very skewed distribution of CDM projects within the country.

The three big projects are two nitrous oxide destruction projects in the fertilizer industry and the largest hydropower project in CDM in Pakistan. The remaining 49 projects of much smaller size are distributed amongst the categories of waste management projects, energy efficiency projects, fuel switch projects using biomass and a number of small renewable energy projects. The largest number of projects are in the energy efficiency (29) category followed by the biomass fuel switch projects (9).

The skewed distribution of projects within Pakistan is also replicated at the global level where the destruction of industrial greenhouse gases with large global warming potential also provide the most significant contribution to climate mitigation under the Clean Development Mechanism at the global level.

The skewed nature of the distribution of CDM projects within Pakistan reflects the character of CDM as providing a cheaper way for enterprises in the Global North to achieve their mandatory emission reduction targets under the Kyoto Protocol.

The Designated National Authorities (DNA) within countries of the Global South are given the responsibility under CDM to ensure the sustainable development aspects of CDM as against the climate mitigation aspects which are ensured by the auditing of CDM mitigation efforts by the Designated Operational Entities(DOEs) under the supervision of the Executive Board of the CDM. The DNA within Pakistan and many other developing countries do not impose any significant Sustainable Development conditions and Pakistan is quite happy to acts as a promoter of the additional CDM financial inflows that CDM projects will generate.

CDM is a project based mechanism rather a sector wise approach to climate mitigation. A sector wise approach requires an integrated approach to climate mitigation efforts which combine subsidies and incentives to particular sectors. For example transport contributes significantly greenhouse gas emissions within Pakistan but does not appear in the CDM profile in Pakistan or for that matter in the CDM profiles of many countries in the developing world. Cooking stoves are also distributed emission sources like cars and appear in CDM profiles of many countries but private cars which make much bigger contributions to carbon emissions are conspicuous by their absence within CDM projects.

Additionality criteria of CDM projects in Pakistan?

When does a project satisfy the additionality criteria? One aspect of additionality relates to the offsetting of carbon emissions. For example the emission factors of gas, oil and coal increase as we move from using one fossil fuel to the next in this list. The generation of energy by a fossil fuel switch will be additional for a switch from coal to natural gas as the emission factor of natural gas is less than that of coal.

However if coal is more expensive than natural gas the use of natural gas will be financially attractive already and this will be a business as usual (BAU)project and not additional. This aspect can be described as the financial additionality criteria which means that a fuel switch project will be additional if the switch is financially more expensive and requires the addition of CDM finance to ensure profitability of a project. A project will be additional when it satisfies additionallity in climate terms and financial terms. Another example useful to understand additionality is a fuel efficiency project. A fuel efficiency project will satisfy the climate additonality criteria as it will produce the same amount of energy with lesser amounts of carbon emissions. However a fuel efficiency project could also be so financially attractive so that it will result in cost savings and will then be a business as usual project. If the fuel efficiency project is less financially attractive it will not be a business as usual project and the CDM finance will raise the rate of return on investment and make a previously unviable project viable. Financial additionality then requires that these fuel efficiency projects are not too attractive to make them BAU projects viable without CDM finance and not so unattractive that CDM cannot turn an unviable project into a viable project. The purpose of this discussion is to highlight the uncertainties in financial additionality which is reflected in the fact that financial analysis of a project are often made available in different forms for different audiences. The financial analysis for potential investors may be quite different from the financial analysis presented in the CDM project documents.

Which projects have questionable additionality in Pakistan?

A number of projects in Pakistan can be characterized as having questionable additionality because of the criteria of additionality involving both climate additionality and financial additionality.

a) Large hydropower projects

Large hydropower projects will satisfy climate additionality as carbon emissions are more significantly upstream or downstream of the project (i.e. indirect) and direct emissions are frequently just described as methane emissions due to flooded vegetation in the dam catchment area. However financially additionality requires the project should not be BAU without CDM finance. Low carbon prices are unlikely to turn a non viable project into a viable project particularly in large and long gestation period projects like large hydropower projects.

Most large hydropower projects will view CDM finance as improving financial returns rather than making an unviable project into a viable one. The projects are likely to proceed with or without CDM finance.

b) Similarly fuel efficiency projects will satisfy the climate additionality requirement but engage with much more uncertainty in the financial additionality requirement. Is the cost saving in the fuel efficiency project sufficient to make the project a BAU project or is it so small that even with CDM finance the

project remains unfeasible? Only a narrow range of cost saving projects will make the CDM project viable. An interesting example is the fuel efficiency projects in the sugar industry which burn bagasse to produce energy at higher temperatures and pressures to increase efficiency and generated carbon credits. Normally fuel efficiency projects are expected to reduce the emission factors of fossil fuels below BAU levels and then claim to reduce carbon emissions and earn carbon credits. Bagasse CDM projects claim that a fuel with an assigned zero emission factor can reduce emissions by being burnt more efficiently. The assumption of carbon neutrality for biomass creates this paradox.

c) Biomass fuel switch projects

Climate science tell us that fossil fuel consumption is an irreversible process whereby the carbon produced cannot return to its source as fossil carbon. However terrestrial carbon contributes to both accumulation of carbon in the atmosphere and sequestration of carbon from the atmosphere at approximately the same magnitudes of flow of carbon per year. Terrestrial carbon flows are thus reversible as the terrestrial carbon pool and the atmospheric carbon pool are in an almost dynamic equilibrium. Deforestation contributes to disturb this dynamic equilibrium and results in the accumulation carbon emissions in the atmosphere by reducing the role of trees in carbon sequestration. Similarly large scale combustion of biomass for energy production will result in carbon accumulation in the atmosphere although different time scales of the regeneration of different types of biomass will affect the dynamics of this process. However in a period of climate instability the dynamical effects are more significant than the equilibrium effects. Governmental policies towards the switch from fossil fuels to biomass attempt to use the variety of biomass regeneration times to distinguish between renewable biomass (like crop residues) and non-renewable biomass (like wood from trees). However the emission of carbon from biomass burning remains a fast process (instantaneous) while the subsequent sequestration is always a much slower process (sometimes approaching hundreds of years). Biomass consumption for subsistence needs is quite different from the consumption of biomass for the needs of capital accumulation. The patterns of consumption of commons regimes (subsistence) and resource regimes (accumulation) are quite different. Thus the distinction between fossil carbon and biospheric carbon overlay another conflict between resource regimes and common regimes. Some authors have described the commodification process involved as the creation of socio-ecological commodities. Here the climate additionality criteria also becomes questionable as the inherent measurement uncertainties undermine the need of precise measurement for commodification to be successful.

Sustainable Development and Climate Mitigation

The Clean Development Mechanism is intended to have a dual objective of mitigating climate change which is measured by the Certified Emission Reductions

(CERs) generated by a project in the Global South and Sustainable Development. Sustainable Development does not have a well defined quantitative description but qualitatively includes the avoidance of intensification of other environmental rifts when addressing the climate rift and countering the tendency for economic growth to intensify economic inequalities. Using these criteria we can qualitatively describe the relation between contributions to climate mitigation and sustainable development in CDM projects in Pakistan.

The two largest CDM projects in Pakistan are the destruction of nitrous oxide gas projects in the fertilizer industry. These projects can be characterized as projects with large carbon offset contributions (1508 kCERs annually) but with no significant sustainable development contributions.

Efficient cooking stove projects in Jaranwala (Punjab) and renewable energy projects in Chitral and the Northern Areas have significant Sustainable Development contributions as they enhance the livelihood of rural populations but they contribute very little in terms of carbon offset contributions as only 217 kCERs are expected annually from the six projects combined.

This suggests that there is little synergy between climate mitigation and sustainable development contributions of CDM projects instead there appears to be a trade off where large contributions in climate mitigation are accompanied by small contributions in sustainable development and vice versa i.e. projects with large contributions to sustainable development contribute little to climate mitigation.

Conclusions

Why should Pakistan have a more critical approach to the CDM? This was the question we set out to address in this article. We can summarise our conclusions in the following points.

1) CDM is a zero sum game

   Pakistan's involvement in CDM does not add any more global carbon mitigation to the targets set for the countries in the North subject to mandatory emission reductions. It also does not open up a new structural pathway to a low carbon development model but instead enables large polluting projects gain some marginal reductions with CDM financial flows as an incentive.

   It helps the countries in the North achieve their emission reductions more cheaply and in this sense may delay the structural change required in the North.

2) The future viability of CDM is linked to the future viability of Cap and Trade and Carbon Trading in the North.

If carbon trading suffers from severe difficulties in addressing the global climate instabilities, as argued by many critics, then CDM will also collapse when Carbon Trading collapses. It is not an independent contribution to climate mitigation from the Global South.

3) The questionable additionality of CDM projects in Pakistan and the Global South implies that these CDM efforts are likely to result in increased emissions over the targeted emissions of the Global North under the Kyoto Protocol. In other words many CDM projects in the South are essentially Business as Usual projects with perverse incentives to projects which erode the climate integrity of the Kyoto Protocol.

4) CDM projects are biased in favour of large polluters which through marginal changes in efficiency or fuel switch can generate large carbon offsets. The overhead costs of CDM projects can be met relatively easily and these projects enable routine efficiency projects to gain CDM credits. The bias in favour of large projects means that instead of having a growth in a large number of small offset projects it is more attractive for developers to engage with a few large projects rather than many small projects. Some new schemes such as PoA (Programs of Activities) and NAMA (Nationally Appropriate Mitigation Actions) have been introduced into CDM to attempt to address this kind of criticism. They however remain with the broader framework of carbon trading which itself exhibits the big polluter bias discussed here.

5) Lastly CDM was originally intended to address the issue of climate debt resulting from the overuse of the atmosphere by a few countries of the North since the time of the industrial revolution. Instead of reparations for this overuse of the atmosphere as a dump for the wastes of industrial production CDM now requires that enterprises in the South earn their carbon credits through enabling industries of the North meet their emission targets at reduced costs. Climate reparations have been replaced a system of earning Payment for Ecosystem Services in the South. The structural inequalities of the global system are thereby reinforced and strengthened.

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