Climate Change and Intellectual Property after COP 15: In Search of a Workable Framework for the Transfer of ESTs*

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Climate change is viewed as one of the most serious threats to the global environment and to sustainable development. Government representatives, environmentalists, lawyers, industry groups, development lobbyists, human rights activists and carbon traders, all agree on one thing: Innovation and new technologies will play a crucial role in meeting the challenge of global climate change. But the lack of investment capacity for R&D on ESTs in developing countries on the one hand, and on the other all those recourses available in developed countries with strong private entities has brought forth a debate of intellectual property rights (IPR) and climate change. This calls for striking a balance between the interest of IPR owners in developed countries and potential users in developing countries to facilitate technology transfer for the mitigation and adaptation to climate change. This paper will try to evaluate technology transfer issues from the context of international environmental law and intellectual property law and suggest some possible means for a successful climate negotiation and transfer of ESTs.

1. Background

Climate change is viewed as one of the most serious threats to the global environment and to sustainable development. Adverse impacts on human health, food security, infrastructure, economic activity, biological diversity and natural resources are expected.[1] Most of the world's scientists agree that rising concentrations of greenhouse gases in the Earth's atmosphere emitted by human activities are leading to changes in the climate. The most recent Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) completed in November 2007[2] finds with more than 90 percent certainty that human actions since the Industrial Revolution have contributed to the warming climate.[3]

The response to climate change problems is fundamentally linked to pressing concerns of sustainable development and global fairness; of economy, poverty reduction and society; and of the world we want to hand down to our future generations.[4] Government representatives, environmentalists, lawyers, industry groups, development lobbyists, human rights activists and carbon traders all agree on one thing: Innovation and new technologies will play a crucial role in meeting the challenge of global climate change.[5] But most of the developing and least developed countries (LDCs) do not have resources for research and development (R&D) or access to these advanced technologies (hereinafter used as Environmentally Sound Technologies: ESTs) necessary for mitigation and adaptation to climate change.

The lack of investment capacity for R&D on ESTs in developing countries on the one hand, and on the other all those recourses available in developed countries with strong private entities has brought forth a debate of intellectual property rights (IPR) and climate change. IPR refer to the protection of rights for the owners of ideas and innovation, research and development, manufacturing processes and technology, as well as the required payment of royalties for the use of patented items, and investors and companies in developed countries are not interested in transferring their technologies to the developing

countries due to lack of proper IPR protection. This calls for striking a balance between the interest of IPR owners in developed countries and potential users in developing countries to facilitate technology transfer for the mitigation and adaptation to climate change.

Before embarking into the details of debate regarding IPR and technology transfer, it may not be out of place to mention some key organisations and terms, such as the World Intellectual Property Organisation (WIPO), the World Trade Organisation (WTO), Trade Related aspects of Intellectual Property Rights (TRIPS), Multilateral Environmental Agreement (MEA), the United Nations Framework Convention on Climate Change (UNFCCC) and the Conference of Parties (COP). The international intellectual property system as we know it today can be traced back to the Paris Convention of 1883 and the Berne Convention of 1886. The adoption of both the Paris and Berne Conventions was accompanied by the establishment of secretariats in the form of international bureaux. The two bureaux were merged in 1893 to create the *Bureaux Internationaux reunis pour la protection de la propriete intellectuelle* (BIRPI) in Berne, the immediate predecessor of WIPO.

The idea of transforming BIRPI into an international intellectual property organization initially arose at the 1962 meeting of the Permanent Bureau of the Paris Union and the Berne Union.[6] At that meeting, the Permanent Bureau recommended the setting up of a Committee of Governmental Experts to consider administrative and structural reforms to the Paris and Berne Union systems and prepare for a diplomatic conference. Finally, WIPO came into being, with its headquarters in Geneva, in 1970 when the Stockholm Convention came into force, and subsequently became a specialized agency of the United Nations (UN) in 1974. In addition to the Paris and Berne convention(s), WIPO now administers 23 agreements relating to IPR.[7]

Therefore, WIPO maintains comprehensive lists of intellectual property agreements for copyright, patent, trademarks, design and other related IPR fields. Despite having comprehensive coverage, enforcement mechanisms for the IPR under the WIPO agreements are voluntary in nature, hence not that much effective, which triggered the situation for the adoption of the TRIPS Agreement under the WTO.

The adoption and entry into force of the WTO's TRIPS Agreement substantially changed the international intellectual property regime by introducing the principle of minimum standards and mandatory enforcement mechanisms.[8] It is also noting that the principle constitutes a significant conceptual and strategic basis for subsequent multilateral and bilateral intellectual property negotiations aimed at setting higher and more expansive standards. Its effect is that any intellectual property agreement negotiated subsequently to TRIPS among and/or involving WTO members can only create higher standards. These higher standards and compulsory enforcement mechanisms have consequently been debated by the developing countries as a barrier to technology transfer at the forum of different MEAs.

An MEA is a legally binding agreement between two or more countries containing specific environment-related objectives and commitments. MEAs, in some form, have been in place for about a hundred years.[9] Countries that ratify after adoption and signature or accede to a particular international agreement are called Parties. They meet periodically through COP to assess different aspects and implementation of MEAs.[10] Most of the MEAs have been developed in the last three decades, especially since the 1972

International Stockholm Conference on Human Environment. Some studies conservatively estimate that approximately 700 MEAs are currently in place.[11] Among them, UNFCCC and its Kyoto Protocol specifically deal with the issues of climate change.

In 1992, UNFCCC was adopted as the basis for a global response to the problem of climate change. With 194 Parties (193 States and one regional economic integration organization –the EU), the Convention enjoys near-universal membership.[12] The ultimate objective of the Convention is to stabilise greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system. The Convention is complemented by the 1997 Kyoto Protocol, which has 191 Parties (190 States and one regional economic integration organization – the EU).[13]

Under the Kyoto Protocol, 37 industrialised countries and the European Union have committed to reducing their emissions by an average of 5 percent by 2012 against 1990 levels.[14] Although industrialized countries must first and foremost take domestic action against climate change, the Protocol also allows them to meet their emission reduction commitments abroad through so-called "market-based mechanisms".

For example, one of the Protocol's market-based mechanisms, the clean development mechanism (CDM),[15] permits industrialized countries to earn emission credits through investment in sustainable development projects that reduce emissions in developing countries. The UNFCCC and its Kyoto Protocol are also designed to assist countries in adapting to the inevitable effects of climate change. They facilitate the development of techniques that can help increase resilience to climate change impacts – for example, the development of salt-resistant crops – and to exchange best practices with regard to adaptation.

Despite these initiatives under the UNFCCC and the Kyoto Protocol, technology transfer for the adaptation and mitigation of climate change remains a debatable topic considering the patent protection of the relevant technologies, associated high costs of royalties and low level of technological development in the developing and least developed countries.

One remedy proposed by some public interest groups and developing countries is to change the international laws on patents so that the full weight of IPR is not applied to ESTs.[16] But an inclusion of patent waiver provisions in the Multilateral Environmental Agreements (MEAs) is not enough to ensure transfer of ESTs. While IPR are internationally regulated by agreements under the WIPO and WTO, respectively, IPR are not expressly mentioned in the leading MEAs dealing with climate change issues, especially in the UNFCCC and the Kyoto Protocol. It is, however, argued that an 'enabling environment' for transfer of technology – the establishment of the institutions, regulations and policies – is needed to promote technology transfer. But what would be the role of IPR in making 'enabling environment' is not clarified or mentioned. Nor is it, despite the existence of technology transfer provisions in the agreement between WIPO and the UN recognising WIPO as a special UN agency[17] and in the WTO TRIPS agreement, clarified how far IPR can be exploited in the context of climate change.

During the 15th Conference of Parties (COP 15) of the UNFCCC in Copenhagen December 7-18, 2009, high level negotiators from 192 nations tried to address the significant changes urgently needed to mitigate the effects of global warming and climate change, including transfer of ESTs.

This short paper will try to evaluate technology transfer issues from the context of international environmental law and the IPR regime and suggest some possible means for a successful negotiation and transfer of ESTs.

2. Technology transfer and ESTs

The term 'Technology Transfer' has been defined in IPPC's Special Report on Methodological and Technological Issues on Technology Transfer (2000) as "a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders". Chapter 34 of Agenda 21 (The Rio Declaration on Environment and Development, 1992)[18] defines ESTs as technologies, which:

protect the environment; are less polluting;

use all resources in a more sustainable manner;

recycle more of their wastes and products; and

handle residual wastes in a more acceptable manner than the technologies for which they are substitutes.

ESTs are therefore technologies with the potential for significantly improved environmental performance relative to other technologies.

Agenda 21 also contains several other important statements to guide the interpretation of this definition with emphasis on facilitating access to and transfer of technology, particularly in developing countries, as well as the essential role of capacity building and technology cooperation in promoting sustainable development. Thus, successful technology transfer means that it is necessary to take a broad view of 'Technology' meaning not only machines and equipment but also the skills, abilities, knowledge, systems and processes necessary to make things happen, i.e. the total system of know-how, procedures, goods and services, as well as organizational and operational measures, and it should include both adaptation and mitigation technologies.

Below the commitments made under the MEAs and the IPR agreements for the technology transfer are examined to see how far these are effective to facilitate transfer of ESTs in the context of such a broad view.

3. Commitments under UNFCCC and IPR Agreements

Under MEAs like UNFCCC states are under an obligation of technology transfer. The technology transfer regime in UNFCC is established by Articles 4.5 and 4.7. Article 4.5 provides:

"The [developed countries] shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to [developing countries] …"

During COP-7 (2001) in Marrakech, Morocco, in the final accord the parties agreed to the adoption of a framework for meaningful and effective actions to enhance the implementation of Art. 4.5 of the UNFCCC[19]. Five key activities were mentioned: Technology need assessments, technology information, enabling environments, capacity building and mechanisms for technology transfer.

Article10.6 (c) of the Kyoto Protocol commits Parties to

"cooperate … for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance practices and processes pertinent to climate change… including the formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain and the creation of enabling environment for the private sector, to promote and enhance the transfer of access to, environmentally sound technologies".

The Rio Declaration on Environment and Development, one of the many outputs of the UN

Conference on Environment and Development (1992), specifically mentions in Chapter 34 that:

"States should cooperate ... by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies".

To sum up, in the above provisions is reflected that required finance and cooperation for an 'enabling environment' between the developed and developing countries and with private entities is necessary for the successful transfer of ESTs. But till date there is no coherent framework, and the lack of enabling actions for the successful EST transfer as mentioned in the above MEAs is due to following fundamental problems:

First, non-binding character and vagueness of obligations and ineffective compliance mechanisms: In the above mentioned provisions of the UNFCCC and the Kyoto Protocol and the final accord wordings like 'all parties' shall 'promote', 'facilitate' 'cooperate' or 'agree' on the EST transfer or some practicable steps, open for too many discretions and loopholes and hence are not effective for the meaningful transfer of ESTs.[20]

Second, the lack of proper definitions of ESTs: In most of the MEAs due to an insufficient, or non-existent, definition of what constitutes ESTs and debate as to process of ESTs transfer precisely may create problems for the successful transfer of ESTs.[21]

Third, none of the MEAs mention anything about the possible conflict between transfer of ESTs and IPR: The language of the Kyoto Protocol, emphasizing the role of the private sector (as well as public sector and public domain technologies), is devoid of specific commitments, whereas the Rio declaration mentioned new and innovative technologies but lacks an effective compliance mechanism. Thus, it is not clarified what would be the possible solution if there is a conflict between the commitments of technology transfer and other international agreements such as the patent law provisions of the TRIPS.

All these fundamental problems call for the development of a coherent EST transfer regime that can be used in MEAs as well as in trade and technology agreements. But before searching for balanced solutions between MEAs and IPR agreements, also some of the often cited commitments for the technology transfer under the IPR agreements will be mentioned here to show the obligation of the developed countries to facilitate technology transfer to the developing countries.

Article 1 of the Agreement between the WIPO and the UN states:

"The United Nations recognizes the World Intellectual Property Organization… as a specialized agency and as being responsible for taking appropriate action in accordance with its basic instrument, treaties and agreements administered by it, inter *alia*, for promoting creative intellectual activity and for facilitating the transfer of technology related to industrial property to the developing countries in order to accelerate economic, social and cultural development, subject to the competence and responsibilities of the United Nations and its organs..."

Article10 of the Agreement explicitly mentioned technology transfer:

"The Organization agrees to co-operate ……. in promoting and facilitating the transfer of technology to developing countries in such a manner as to assist these countries in attaining their objectives in the fields of science and technology and trade and development".

However, before embarking into resultant action based on above provisions also the similar provisions in WTO/TRIPS should be mentioned. In Article 7 TRIPS the objectives of the Agreement are stated:

"The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations".

Article 8.2 TRIPS mentions that WTO Members may take:

"appropriate measures, provided that they are consistent with the provisions of this Agreement, … needed to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology".

Furthermore, Article 66.2 TRIPS provides that:

"Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base".

Therefore, a close scrutiny of the above provisions of the UN/WIPO and WTO/TRIPS reflect that, in spite of the fact that the primary objectives of the WIPO and WTO Agreements are to ensure effective protection and enforcement of IPR, these Agreements also include commitments to facilitate the transfer of technology to create a "sound and viable technological base" (as mentioned in TRIPS) and "to accelerate economic, social and cultural development in the developing countries" (as mentioned in the UN/WIPO Agreement). But in reality there is a considerable gap between the intentions expressed on the agreed technology transfer provisions and the resulting actions.[22]Even if there exist some flexibility in defining inventions, exception to patent rights and the freedom to determine national patent laws while implementing TRIPS and other IPR agreements, the overall framework favours IPR holders.[23]

E.g., in the context of technology transfer Article 8.2 of TRIPS is important, since the necessity to prevent the resort to practices that adversely affect the international transfer of technology is acknowledged. But at the same time it is stipulated that the measures should be consistent with the provisions of the (TRIPS) Agreement. Article40.2 TRIPS state that only if such practices constitute an "abuse" of IPR and have an "adverse effect on competition in the relevant market" Members are free to adopt appropriate measures. Thus, are possible actions under Article 8.2 circumscribed by Article 40?[24] In fact, the capacities of states to take steps that prohibit anti-competitive practices in technology transfer seem to be severely limited. This raises questions about the scope of competition policy in fostering technology transfer and in prohibiting anti-competitive practices.[25]

Again, it is argued by the LDC's that the commitment of technology transfer under the Art. 66.2 of TRIPS is not implemented and/or no meaningful actions have been taken to fulfil the provision till date[26]. In fact, Article 66.2 of TRIPS does not specify what type of incentives must be created, or how effective these incentives must be; developed countries have essentially been left to implement the provision, or not, as they consider fit. However, during the February 18-20, 2003 meeting of the Council for TRIPS (TRIPS Council), a 'Decision on Implementation of Article 66.2 of the TRIPS Agreement' was adopted that requires developed-country members to submit yearly reports detailing the incentives they have created for technology transfer to LDCs.[27] These reports are then discussed annually at meetings of the TRIPS Council, but there is no agreed standard by which to evaluate them, and again some LDCs and commentators have expressed dissatisfaction with the level of assistance given by the developed countries in this regard.[28]

Therefore, unless it is clarified how these provisions should be implemented and what resultant actions are to be taken in the context of climate change, the role of IPR for the transfer of ESTs cannot be precisely defined. Nevertheless, how IPR rules are debated from the environmental perspectives, especially during climate change negotiation, may give some guideline for a future solution.

4. The debate over climate change and IPR rules

During climate change negotiations it is reflected that developing countries are more vulnerable to the negative impacts of climate change given their greater dependence on the natural environment and demographic size. At the same time they lack access to appropriate ESTs as well to mitigate and adaptation to climate change.[29] This is why technology transfer has long been a theme at environmental summits, dating back to the 1972 Stockholm Convention followed by the Rio Declaration 1992, and in all COP of the UNFCCC, but without any meaningful solution to address IPR issues related to transfer of ESTs. This has consequently also been mirrored in the meetings of WIPO and WTO in the aftermath of the Rio Declaration where more and more divergence has been spurred. Although in the wake of the Copenhagen Meeting the link between transfer of ESTs and IPR provisions was debated from climate change perspectives, the final settlement, the so-called Copenhagen Accord, did not address this issue.[30]

Debates at the Conference of Parties under the UNFCCC Conference (in the Ad-hoc Working Group on Long-term Cooperative Action) over the appropriate role of IPR in climate change technologies illustrate the stunning split between those in favour of a strong IPR regime and those against this[31]. For example, industrialized countries such as the United States of America (USA) and Australia seek improvement of IPR protection and enforcement, whereas developing countries such as Brazil, India and China seek mechanisms that avoid 'over-protectionism' of patents.[32]Most of the LDCs also support the position of Brazil, India and China.

But TRIPS include transitional provisions in Art. 66.1, which allows the 32 LDCs to be exempted from TRIPS regulations until 2013 (and until 2016 for pharmaceutical products). Even without having any patent protection for the ESTs in the LDC's, they still lack access to ESTs; therefore, making compulsory licensing for ESTs while making TRIPS compliant regime in these countries from July 2013 may not change the situation, as most of them lack adequate technical capacity and skill to exploit ESTs. A report commissioned by the European Commission (DG Trade, 2009) on the technology transfer issues determined that:

"dismantling or weakening the intellectual property rights system would not only hinder the access of developing countries to costly technology, it would also hinder the access to low cost technology as IPR protected technology is also to be found among the low abatement cost technologies".[33]

Scholars like professor *Keith Maskus* believe that IPR is not the most important issue surrounding technology transfer. Instead, for effective technology transfer infrastructure, absorption capacity (including human capital) and governance must be in place[34]. Furthermore, in a UNFCCC survey of developing and poorer nations the lack of financial resources is identified as the main economic and market barrier to technology transfer, while few nations consider IPR as a significant impediment, ranking IPR behind nine other barriers in terms of importance.[35] The main barriers include: high investment costs, incompatible prices, subsidies and tariffs, lack of incentives, consumers' low

income, high upfront costs, and lack of access to credit.[36]In this context, the Secretary General of the UN Conference on Trade and Development, *Supachai Panitchpakdi*, said that "intellectual property is a critical issue in technology transfer".[37] He quoted a Chatham House report that concludes that "the IP system is too cumbersome. Instead the rules must strike a balance between IP holders and the public interest, and the Copenhagen meeting should right that balance".[38]

Although the Copenhagen Accord failed to make that balance, it would not be out of place to examine the provisions of the accord, which may have some relevance to the issue of technology transfer.

5. COP 15 and technology transfer: n search of a workable framework

5.A. COP15 Accord and technology transfer

In the COP 15 Final Accord, although developed countries made certain announcements in relation to emission reduction targets and financial pledges, no similar intention was reflected in the area of technology transfer and co-operation. Sweden, on behalf of the European Union (EU), mentioned in general terms that "a system should be established to provide long-term support to developing countries for reducing emissions, adaptation, technology co-operation and transfer." Developing countries, on the other hand, called on developed countries to honour their commitments and speed up the transfer of ESTs.

The Copenhagen Accord intends to establish a 'Technology Mechanism' to accelerate technology development and transfer in support of actions on adaptation and mitigation. It further specifies that the mechanism will "be guided by a country-driven approach and be based on national circumstances and priorities" (para. 11). And technology is mentioned in other parts of the Accord, such as para. 3, which states that:

> "developed countries shall provide adequate, predictable and sustainable financial resources, technology and capacity-building to support the implementation of adaptation action in developing countries."

But in reality, all these jargonized, beautifying words are useless for solving the tension between climate change and transfer of ESTs and related IPR issues.

At stake are not only issues of global concern that are too complex to be narrowed down to one-type issues such as 'banning patents' or 'a complete waive of IPR to ESTs', as argued by some developing countries. Developing countries are not to blame for climate change and should therefore be 'reimbursed' by the rich polluting nations.[39] Developing countries will not bear any responsibility, leaving obligations only to the developed world. To support such a position, one strong argument, reiterated and at times simplified by the media, is that countries in the developed world have caused most of the world's climate issues since their industrialization from the 1850s, and they should therefore pay for it.[40]

We should, however, not forget that, "an eye for an eye will make the whole world blind".[41] The way forward is rather shared responsibilities than someone to blame. In the Singapore Declaration on Climate Change, Energy and Environment 'Common but Differentiated Responsibility' is invoked and is reaffirmed by stressing that:

> "all countries should play a role in addressing the common challenge of climate change, based on the principles of common but differentiated responsibilities and respective capabilities; and that developed countries should continue to play a leading role in this regard".[42]

5.B. Towards successful climate Negotiations and a workable framework for the transfer of ESTs

The debate over the transfer of ESTs mostly goes on in the context of climate change negotiations under the UNFCCC. But related IPR issues are mostly subject matter of WTO TRIPS agreement. As TRIPS do not specify the treatment of climate change or ESTs, developing nations have sought support in the Doha Ministerial Declaration on a public health exemption under TRIPS. In this way, poorer nations would gain access to ESTs through compulsory licensing[43] by arguing that climate change represents a national health emergency. There are, however, serious flaws in this argument.

The patent issues for ESTs are not the same as pharmaceuticals, as ESTs require many different technological inputs. Japan and the EU argue e.g. that while there is generally only one patent per pharmaceutical product, climate change mitigation technologies almost always require numerous patents held by many different firms[44]. In fact, neither waivers nor banning or compulsory licensing of ESTs may contribute to the reduction of climate change. It might be useful for some technologically developed developing countries like China, India, South Korea, Brazil and South Africa with technical capacity to imitate, but the LDCs, despite having the IPR exemption until 2013, cannot make use of a possible free access to ESTs under a compulsory licensing regime due to lack of technical capacity and know-how. Therefore, for the LDCs and vulnerable states compulsory licensing provisions cannot be the solution. Furthermore, research based institutions and multinational organizations may not be interested in working on the technologies required nor willing to transfer their technology to countries with weak IP laws.

In conclusion, the debate over IPR issues involving stubborn position on compulsory licensing or banning of patents to ESTs in the UNFCCC may rather risk preventing the involved parties from reaching viable solutions for climate change and increasing tensions between the environmental regime under the UNFCCC and the trade-related IPR regime under WTO/TRIPS. Their objectives are different. It is also worth mentioning that the UNFCCC has no mandate to make a patent waiver for ESTs. This does not contradict the crucial needs to accelerate use of ESTs around the world, which could be a way of reconciling the works of both organizations. However, wishful declarations on transfer of ESTs will not be meaningful, and no deal is better than a bad deal in this context. That is why successful negotiation over green house gas reduction, funding and more efforts for country and region specific technology development, and not least the creation of a culture of 'Technology Exchange' without going beyond the existing IPR regime, may give better future result than campaigning and debating over technology transfer and waivers.

5.B.I)Technology exchange between the GE-10 and the vulnerable-5 during the UNFCCC summit:

Rather than trying to make an agreement between over hundred countries, effective solutions may be easier to reach among representatives of bigger interest groupings based on their global emissions (GE) and vulnerability (V) due to climate change problems. Therefore, there may be a system of negotiating parties divided into two groups:

- The GE-10 consisting of the USA, the EU, Australia, Brazil, Canada, China, India, Japan, Russia and South Africa, which accounts for more than three-quarters of the total GE, and

- The Vulnerable 5 consisting of: one representative from other developing countries[45], one from the African Group as IPCC Fourth Assessment Report February 2007[46] termed Africa as one of the most vulnerable continents to climate change,[47] one from the Small Island States,[48] one from the most vulnerable LDC's,[49] and the fifth one will be IPCC and UNEP as jointly representing 'the global public interest Ombudsperson' (who will take submissions from other national, regional and international public interest groups on the related issues).[50]

5.B.II) Financing and capacity building: towards culture of technology exchange

In Copenhagen, developed countries committed to providing U$30 billion for mitigation and adaptation for the period 2010 to 2012, most of which will flow through a Copenhagen Green Climate Fund established as an operating entity of the financial mechanism of the UNFCCC, i.e. the UN Global Environment Facility. But simply money to vulnerable states may not work. In my view, it would be better to make a long-term plan for the utilization of the fund and to have more commitment for the utilization of ESTs, their development and technology transfer. This new 'Technology Exchange' may work in the following way:

- *Establishment of Technology Assessment Reports:* All the LDCs, which are the most vulnerable states, and the African group will be encouraged to make country specific studies on technology assessments for climate change mitigation and adaptation technologies and related IP issues, to be reviewed by the UNEP and IPCC from an environmental perspective and by WIPO from IP perspective, or a coordination body may be established. It will clearly mention technologies in the public domain, existing patented technologies and future technologies.

- *Funding for technology development and transfer: Related IPR issues:* On the basis of technology assessments, local and/or regional research centers will be given 'result and goal oriented' funding, provided that they use the funding for the research and development of technologies necessary for the climate change mitigation and adaptation in the particular country and region. They will be encouraged to exchange their research and findings with other similar research centres. Where applicable, UNEP and IPCC will negotiate on behalf of a particular country for the transfer of patented ESTs, (if necessary) for climate change mitigation and adaptation in the respective countries.

- *Research on country and region specific ESTs* should establish future potential technologies, public and private partnership.

- *For sharing technology*, the Canadian approach[51] to the determination of royalties may be adopted as a prototype, based on the ranking of concerned importing countries in the Human Development Index (HDI) of the UNDP. The Canadian royalty guidelines result in relatively low royalties.[52]

In addition, the above approach of capacity building on ESTs in the developing countries and LDCs within the culture of 'Technology Exchange' may also be integrated as an interpretation of Art. 66.2 of TRIPS to implement

obligations and commitments of the developed countries for technology transfer to the LDCs.

6. Concluding remarks

If the above mechanism is successfully implemented, developing countries will emerge as technology owners at a certain point of time rather than simply being technology users, and it will create a viable culture of 'Technology Exchange' between the North-South and the South-South rather than a simple one way technology transfer. On the other hand, separate arrangements under the WTO regime to support actions taken under the UNFCCC may not be necessary, if the WTO would make an explanatory clause to Art. 66.2 to better enforce the obligation to transfer ESTs to the LDCs. In this way, the UNFCCC could make a solution for the transfer of ESTs which is development-friendly and IPR-consistent and at the same time workable for enhancing the use of ESTs for the mitigation and adaptation to climate change rather than earlier vague provisions without having any resultant actions.

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[1] Azam, Mohammad Monirul, IP Day 2009: Green innovation and technology transfer, The Daily Star, Dhaka, April 15, 2009, available at http://www.thedailystar.net/law/2009/04/04/index.htm.

[2] The United Nations Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to assess scientific, technical and socio-economic information concerning climate change and its potential effects and options for adaptation and mitigation. The IPPC reports are intended to assess scientific, technical and socio-economic information concerning climate change, its potential effects, and options for adaptation and mitigation. The 2007 Report is the so far largest and most detailed summary of the climate change situation ever undertaken, involving thousands of authors from dozens of countries, and states in its summary that "warming of the climate system is unequivocal and most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations." IPCC's First Assessment Report was completed in 1990 and served as the basis of the United Nations Framework Convention on Climate Change (UNFCCC). The Second Assessment Report was published in 1995 followed by the Third Assessment Report in 2001. The Fifth Assessment Report is due in 2014.

[3] Some of the predicted impacts of climate change listed in the IPCC report include: Water availability will increase to 10 to 40 per cent at high latitudes and in some wet tropical areas; Water availability will decrease by 10 to 30 per cent in some dry regions at mid latitudes and in the dry tropics; Globally food production is predicted to increase with warming of 1 to 30°C, but above this it will decrease. Notably, health effects including increased frequency of cardio-respiratory diseases due to higher concentrations of ground level ozone, increased diarrhea disease, increases in malnutrition and consequent disorders, and increased deaths, disease and injury due to heat waves, floods, storms, fires and droughts.

[4] UN Secretary General Ban Ki-moon, UN Climate Change Conference in Bali, Indonesia, December, 2007.

[5] Azam, Mohammad Monirul, Capacity Building on Climate Change Technology in the Least Developed Countries: The Context of Bangladesh, Second International Environmental Conference, January 2-3, 2009, Dhaka, Bangladesh.

[6] Sisule F Musungu and Graham Dutfield, Multilateral agreements and a TRIPS-plus world:

The World Intellectual Property Organisation (WIPO), Quaker United Nations Office (QUNO), Geneva, 2003.

[7] For details on the WIPO administered agreements/treaties see: http://www.wipo.int/treaties/en/, accessed on July 24, 2010.

[8] Munsungu (n. 6).

[9] See for details, Multilateral Environmental Agreements: A Handbook for Afghan Officials, United Nations Environment Programme, Post-Conflict and Disaster Management Branch, 2008.

[10] Unless otherwise mentioned, this article refers to COP as arranged under the UNFCCC only.

[11] Their proliferation is mainly due to an appreciation of the gravity of environmental problems facing our planet today (largely as a result of human activity), plus a growing understanding that environmental issues are often not only local in nature, but also regional and global. Therefore, the solutions and tools to deal with them should also be regional and global in their scope. See for details Multilateral Environmental Agreements: A Handbook for Afghan Officials, United Nations Environment Programme, Post-Conflict and Disaster Management Branch, 2008.

[12] Status of ratification of the UNFCCC, available at http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php, accessed on July 18, 2010.

[13] See note 12.

[14] See for details http://unfccc.int/kyoto_protocol/items/2830.php, accessed on July 16, 2010.

[15] The Clean Development Mechanism (CDM), defined in Article 12 of the Protocol, allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO2, which can be counted towards meeting Kyoto targets. For latest information on CDM see: http://cdm.unfccc.int/index.html, accessed July 19, 2010.

[16] Developing countries like India and China along with public interest groups and independent non-profit international network of organisations like Third World Network claim this kind of waiver.

[17] Agreement between the United Nations and the World Intellectual Property Organization WIPO 1974 (came into effect from December 17, 1974).

[18] Agenda 21 is a programme run by the United Nations (UN) related to sustainable development, and it was the first summit ever to discuss global warming related issues. It is a comprehensive blueprint of action to be taken globally, nationally and locally by organizations of the UN, governments, and major groups in every area in which humans directly affect the environment. The full text of Agenda 21 was revealed at the United Nations Conference on Environment and Development (Earth Summit), held in Rio de Janeiro, Brazil 3-14 June, 1992, where 178 governments voted to adopt the program. The final text was the result of drafting, consultation and negotiation, beginning in 1989 and culminating at the two-week conference. The number 21 refers to an agenda for the 21st century. See for details, http://www.un.org/esa/dsd/agenda21/, accessed on July 20, 2010.

[19] See The Marrakesh Accords for the framework of meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention, available at http://unfccc.int/cop7/documents/accords_draft.pdf (accessed on May 4, 2010).

[20] Klaus Bosselmann, 'Poverty Alleviation and Environmental Sustainability through Improved Regimes of Technology Transfer', 2/1 *Law, Environment and Development Journal* (2006), p. 19.

[21] IPCC, *Methodological and Technological Issues in Technology Transfer 3*, pp. 57-60 and 62-63. (Cambridge: UNEP and WMO, 2000).

[22] UNCTAD, International Arrangements for Transfer of Technology: Best Practices for Access to and Measures to Encourage Transfer of Technology with a View to Capacity Building in Developing Countries, especially in Least Developed countries, UN Doc. TD/B/COM.2/EM.9/2(2001) at 5-6, 14-15. 20.

[23] Srinivas, K. Ravi, Climate Change, Technology Transfer and Intellectual Property Rights, RIS-DP # 153, India, April 2009.

[24] Srinivas (n. 23).

[25] Srinivas (n. 23).

[26] Salma Chaudhuri Zohir and Narayan Chandra Nath, *Development Dimension of the Doha Agenda-A Major Concern*

for South Asia, p. 316, available at http://www.cuts-international.org/SAFIT/chp6-Development.pdf, accessed on May 16, 2010.

[27] See IP/C/28 and further Between Trade and Sustainable Development, *Bridges* Vol. 7, No. 2, March 2003, available at http://www.ppl.nl/ebooks/files/BRIDGES7-2.pdf (accessed on May 15, 2010).

[28] Suerie Moon, Does TRIPS Art. 66.2 Encourage Technology Transfer to LDCs? An analysis of Country Submissions to the TRIPS Council (1999-2007), *UNCTAD-ICTSD Project on IPRs and Sustainable Development, Policy Brief No. 2* (Dec. 2008)

[29] Technologies are necessary both for mitigation and adaptation to climate change in the developing countries. Such as mitigation technology to reduce GHG emissions to avoid the possible impacts of climate change and new varieties of rice to adapt with climate change.

[30] See for details, Copenhagen Final Accord, available at http://unfccc.int/files/meetings/cop_15/application/pdf/cop15_cph_auv.pdf (accessed on December 29, 2009).

[31] UNFCCC, 2009, Conference of Parties, Ad-hoc Working Group on Long-term Cooperative Action Under the Convention, Poznan, 1-10 December, 2008, *Ideas and Proposals on Paragraph 1 of the Bali Action Plan,* Para. 129. U.N. Doc FCCC/AWGLCA/2008/16/Rev.1, United Nations, New York.

[32] See note 31.

[33] Copenhagen Economics A/S and The IPR Company ApS, "*Are IPR a Barrier to the Transfer of Climate Change Technology?*" Copenhagen (19 January 2009), p. 39.

[34] Keith E. Maskus, Kamal Saggi, and Thitima Puttitanun, "Patent Rights and International Technology Transfer through Direct Investment and Licensing," in *International Public Goods and Transfer and Technology Under a Globalized Intellectual Property Regime,* (Eds. Keith E. Maskus and Jerome H. Reichman), Cambridge: Cambridge University Press, 2005, p. 266.

[35] UNFCCC 2006, Subsidiary Body for Scientific and Technological Advice, *Synthesis Report on Technology Needs Identified by Parties not Included in Annex I to the Convention.* U.N. Doc. FCCC/SBSTA/2006/INF.1. United Nations, New York.

[36] See note 35.

[37] As said in the Workshop on technology development and transfer held in New Delhi, October 21, 2009, organised by the Government of India and the United Nations economic and social department. See for details, http://www.twnside.org.sg/title2/gtrends/gtrends272.htm, accessed on July 18, 2010.

[38] See for details, Bernice Lee, Ilian Iliev and et al, Who Owns Our Low Carbon Future? Intellectual Property and Energy Technologies, A Chatham House Report, September 2009, available at http://www.chathamhouse.org.uk/files/14699_r0909_lowcarbonfuture.pdf (accessed on April 1, 2010).

[39] Copenhagen Climate Conference and Patents, available at http://www.ipeg.eu/blog/?p=838, accessed on February 15, 2010.

[40] See note 39.

[41] This is quoted from the writing of Mahatma Gandhi, An Autobiography or The Story of My Experiments with Truth, 1929. This quote is mostly used as a principle of non-violence movement. Although Mahatama Gandhi was not the originator of the principle of non-violence, he was the first to apply it in the political field on a huge scale. Mohandas Karamchand Gandhi (2 October 1869– 30 January 1948) was the pre-eminent political and spiritual leader of India during the Indian independence movement. He was the pioneer of *satyagraha*—resistance to tyranny through mass civil disobedience, a philosophy firmly founded upon *ahimsa* or total nonviolence—which led India to independence and inspired movements for civil rights and freedom across the world.

[42] See for details, Singapore Declaration on Climate Change, Energy and Environment, available at http://www.aseansec.org/21116.htm (accessed on May 3, 2010).

[43] Transfer mechanism whereby governments or international institutions require the holder of IPR to extend licensing to grant use to the state or others. Usually, the holder does receive some royalties, either set by law or determined through some form of arbitration or court procedure. Compulsory licensing is widely disliked by private sector firms who argue that it prevents them from control and therefore reduces incentive to invest in potentially crucial technologies. See for details: Cosbey, A. (Ed.), (2008). *Trade and Climate Change: Issues in Perspective*. Winnipeg: International Institute for Sustainable Development.

[44] Copenhagen Economics A/S and The IPR Company A/S, "Are IPR a Barrier to the Transfer of Climate Change Technology?" Copenhagen (19 January 2009), p.7.

[45] The Group of 77 at the United Nations is a coalition of developing countries, designed to promote its members' collective economic interests and create an enhanced joint negotiating capacity in the United Nations. There were 77 founding members of the organization, but the organization has since expanded to 130 member countries. The group was founded on June 15, 1964 by the "Joint Declaration of the Seventy-Seven Countries" issued at the UNCTAD. This group may work as a coordinating body to represent the other developing countries except those that are included in the GE-10.

[46] In the IPCC Fourth Assessment Report, February, 2007 projections indicate that by 2020, between 75 and 250 million people in Africa will suffer an increase in water stress due to climate change. And the area of the continent suitable for agriculture is likely to decrease, particularly along the edges of semi-arid and arid regions. By 2020, yields from rain-fed agriculture in some countries could decrease by as much as 50%, exacerbating malnutrition and food security problems. What's more, rising water temperatures in large lakes may decrease fish stocks, again affecting food supplies. See for details, http://www.ipcc.ch/ipccreports/ar4-wg1.htm, accessed on September 1, 2010; Achim Steiner, executive director of the United Nations Environment Programme (UNEP) rightly put "Africa is the continent with the least responsibility for climate change and yet is perversely the continent with the most at risk if greenhouse gases are not cut." quoted in: African continent one of the most vulnerable to climate change, See for details, Environmental Research Web, Apr 11, 2007, available at http://environmentalresearchweb.org/cws/article/opinion/27558, accessed on August 25, 2010.

[47] Considering the vulnerability of African countries due to climate change as depicted in the IPCC Fourth Assessment Report, it should be represented as one of the most vulnerable groups. African Union may be invited to work as the united voice for African countries taking the experience from the EU. The African Union is an intergovernmental organization consisting of 53 African states. Established on 9 July 2002, the AU was formed as a successor to the Organization of African Unity (OAU). The prime objectives of AU and its different institutes are to accelerate the political and socio-economic integration of the continent; to promote and defend African common positions on issues of interest to the continent and its peoples; to achieve peace and security in Africa; and to promote democratic institutions, good governance and human rights.

[48] Small Island Developing States (SIDS) were recognized as a distinct group of developing countries facing specific social, economic and environmental vulnerabilities at the United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit, held in Rio de Janeiro, Brazil (3-14 June 1992). This recognition was made specifically in the context of Agenda 21 (Chapter 17 G). The UN recognizes the 38 UN Member States belonging to the Alliance of Small Island States (AOSIS), an ad hoc negotiating body established by SIDS at the UN. However, AOSIS has a membership of 42 States and observers, drawn from all oceans and regions of the world: Africa, Caribbean, Indian Ocean, Mediterranean, Pacific and South China Sea. Therefore, this alliance may become representative body of the small island states.

[49] The LDCs represent the poorest and weakest segment of the international community. Extreme poverty, the structural weaknesses of their economies and the lack of capacities related to growth, often compounded by structural handicaps, hamper efforts of these countries to improve the quality of life of their people. In the late 1960s, the UN began paying special attention to the LDCs, recognizing those countries as the most vulnerable of the international community. With the assistance from The UN Office of the High Representative for LDCs, Landlocked Developing Countries and Small Island Developing States, LDCs may proceed to take united voice for their problems and possible way outs for climate change adaptation and mitigation and required technologies. This office was established by General Assembly Resolution 56/227 as a follow-up mechanism to the Third UN Conference on the Least Developed Countries to ensure effective follow-up, implementation, monitoring and review of the implementation of the Programme of Action for the LDCs for the Decade 2001 – 2010, adopted at that conference.

[50] The UN Office of the High Representative for LDCs, Landlocked Developing Countries and Small Island Developing States may work as a coordinating body for the Vulnerable-5 considering their lack of bargaining and negotiation capacity.

[51] In 2005, Canada proposed royalty guidelines for the export of medicines under the Jean Chrétien Pledge to

Africa Act, which implements the WTO waiver of Article 31(f) of the TRIPS Agreement. The Canadian royalty guidelines are a sliding scale of the generic sales price. The rate depends entirely upon the location of the importing market and the rank of the importing country in the UNHDI. The formula is one, plus the number of countries on the UNHDI, minus the importing country's rank on the UNHDI, divided by the number of countries on the UNHDI, multiplied by 0.04. The rate is then applied to the generic sales price. With 177 countries currently in the UNHDI index, the royalty rate can be expressed as: Royalty rate = 0.04 * [(178) – rank importing country]/177.

[52] During the time of adoption of this royalty approach in 2004, the top rate was 4% of the generic sales price for Norway as it was number one country in HDI, 2004, and the lowest rate was 0.02%, for Sierra Leone as it was last country in the HDI, 2004.