ASIAN DECENT WORK DECADE 2006 2015

International Labour Organization

Research Conference: Green Jobs for Asia and the Pacific

Hotel Okura, Niigata, Japan
21-23 April 2008

Background Paper

Peter Poschen
Senior Advisor Sustainable Development and Climate Change
Policy Integration Department
ILO Geneva

Introduction

The purpose of this paper is to set the scene for the Conference. It aims to clarify concepts and to identify issues and relevant questions. Following a brief discussion of some salient links between green growth and labour markets in the Asia-Pacific region, this paper offers a definition of green jobs and identifies some of the economic sectors and activities where green jobs will play a pivotal role and which appear to have significant potential for creating green jobs.

This paper discusses the complex dynamics of green growth as they affect the labour market and ways of assessing net employment impacts resulting in what are often significant gains and losses in the economy. It concludes by considering resources, in particular the role ILO constituents could play, points to some relevant work under way and identifies challenges and questions for consideration by the Conference.

1. Why green jobs? Economic development, the environment and labour markets in Asia

Economic development

The Asia-Pacific region has been experiencing very rapid economic growth at twice the global rate for almost a decade now accompanied by profound economic restructuring, away from agriculture to more productive and higher-value added industry and service activities.

Brisk economic growth has helped to reduce poverty in the region. The number of working poor living on US$2/day has fallen by 123 million and that on less than US$1/day by 148 million. Much more is still needed to put an end to poverty: over half the workforce in the region, some 908 million workers are still living on less than UD$2/day. Over 300 million continue to experience extreme poverty with less than US$1/day (ILO 2007). Moreover, it may be noted that these figures probably understate the extent of the problem. The uniform US$ 1 and 2/day tend to underestimate urban poverty and the above numbers of poor were calculated before the downward correction of purchasing power parities for the two most populous countries in the region.

Continued high levels of investment, generally favourable labour force trends and growing domestic demand in addition to strong exports suggest that the purely economic prospects continue to be good.

Environmental threats to growth and sustainable development

Some of the most serious threats to economic and broader sustainable development in the region are environmental and social. The economic and demographic dynamism in Asia-Pacific accompanied by rising levels of exports as well as domestic consumption are exerting increasing pressure on the environmental carrying capacity of the region and beyond. ESCAP (2006) notes that demand for water, energy and raw materials in the region has increased by 50 per cent from 1995-2002, almost three times faster than global demand.

The recent escalation of commodity prices may be an indication of the growing environmental footprint and the pressure on natural resources. Commodity prices have soared over the last 4-5 years and nearly doubled for energy and industrial inputs. Even food prices have risen sharply after an almost continuous decline over three decades. Commodity prices have a long history of boom and bust cycles, but as the World Economic Outlook (IMF 2008) notes, the current commodity boom is long, big and broad-based by historical standards.

While some downward adjustments and fluctuation over time are likely, there is reason to believe that commodity prices and thus inputs for industrial production and services will permanently have significantly higher cost in the future. For a number of commodities, the highest quality and lowest cost resources are already being fully exploited. World petroleum production for example has already peaked. Raw material scarcity and prices are likely to trigger adjustments in production patterns and processes. Recycling and reuse can be expected to become increasingly competitive relative to primary raw materials.

A commodity that has lately triggered unrest in a number of countries is food. Asian demand has grown significantly, not least through the change of consumption patterns towards more protein-rich diets as incomes rise. Food security is a concern in the region and some countries have taken measures to prevent shortages. With about 61 per cent of the global population but only 40 per cent of the global land area, Asia has some of the lowest per capita availability of arable land and water, but the highest proportions of degraded land in the world plus high proportions of dry land (ESCAP 2006).

The region has also seen a dramatic decline of its fisheries resources and a degradation of its coastal ecosystems. It accounts for about 60 per cent of global mangrove loss during the decade 1990-2000.

Hundreds of millions are already suffering from episodes of drought, particularly in South Asia, but Australia has also been experiencing persistent drought in recent years contributing to global price hikes for grain. The widespread scarcity of water is aggravated by the deteriorating quality of available water due to widespread pollution of ground and surface water by nitrates, heavy metals and other hazardous substances (ESCAP 2006).

Due to industrial activity and increasing car traffic, air quality in many cities is very poor, a fact highlighted by current debate about the air in Beijing during the forthcoming Olympic Games.

The environmental and health cost of the current economic model of 'grow first, clean up later' are not reflected as negatives in GDP, but are clearly significant and rising. Some analysts suggest that these costs may be the equivalent of GDP growth/year in some Asian countries. This would mean the current economic model is self-defeating and creates no net gains in welfare. In the future, a number of the environmental threats outlined above will be exacerbated by the impacts of climate change.

The growing impact of climate change

Global temperature has risen by 0.74°C over the last century, the largest and fastest warming in the history of the Earth detected by scientists. The trend is accelerating and has affected all continents and most oceans. Temperatures could rise by 3°C over pre-industrial levels by the end of the century (IPCC WG I, 2007).

Global warming follows emissions with a long time lag due to buffering by the oceans and because some greenhouse gases (GHG) are long-lived. The world will experience further climate change even if emissions stopped today, albeit to a much lesser extent than otherwise. Adaptation to climate change in an effort to buffer its negative impacts is therefore inevitable.

Most impacts in the short to medium term will neither come from rising mean temperatures nor from rising sea levels, but rather from increased variability of weather and more frequent and extreme events like storms, droughts, floods and heat waves.

Developing countries have historically contributed least to emissions causing climate change but stand to suffer most because they are the most vulnerable and least able to adapt, particularly populated areas like the Asian mega-deltas, small island states such as those in the Pacific. The economic sectors most dependent on the weather, such as agriculture and tourism, are likely to be most affected along with settlements and industry located in coastal and river flood plains as well as other areas prone to storms.

By the middle of the century, freshwater shortages for more than 1 billion people in Asia are to be expected. Negative impacts on agriculture are already observed in dry parts of Asia.

Averting dangerous climate change

In the medium to long term, projected climate change from current trends will lead to serious disruption of economic and social activity in many sectors on all continents. The technical and economic potential to reduce emissions to levels of climate change considered tolerable exist. Mitigation, i.e. measures to reduce emissions or remove GHG from the atmosphere are both necessary and cheaper than inaction according to the IPCC WG3 (2007) and to the Stern Review (2007).

The total mitigation potential of existing technology is estimated at 16-30 Gt CO2, enough to offset the projected increases in emissions and reduce concentrations of GHG below current levels. Mitigation potentials are significant in all sectors in both industrialized and developing countries. The highest potentials exist in the building sector, in agriculture and in industry (IPCC WG III, 2007).

Scientists suggest that in order to avoid dangerous, possibly irreversible and self-reinforcing climate change atmospheric concentrations of GHG should not exceed the equivalent of 450 ppm CO2. This would result in a warming of 2°C on average. Small islands states have been calling for lower levels because even 2°C warming would have significant impacts on ecosystems, coastlines, infrastructure and water supplies.

Stabilization scenarios show that a 450 ppm maximum requires global emissions to peak over the next 10-20 years. At the same time the trend scenario of the International Energy Agency (IEA 2007) projects a 60 per cent increase in global demand for energy until 2030, needing a total investment of US$20 trillion of which about half in developing countries. While historically, industrialized countries have been responsible for the bulk of emissions, developing, in particular the rapidly industrializing countries are becoming major emitters in spite of comparatively low emissions per capita. Action by the industrialized countries alone will therefore not be sufficient.

Making economic growth and development compatible with stabilizing the climate calls for 'low carbon economies' worldwide. A reduction of emissions by half compared to trend would take cuts of the order of 60-80 per cent in industrialized countries and still need 30 per cent lower levels in developing countries.

Decoupling economic growth from emissions supposes major advances in energy efficiency of products and services, in power generation, in buildings and transport, a significant increase in the use of renewable energy as well as lower emissions from land-use. New technologies will be needed including carbon capture and storage.

Green growth - a second great transformation

As has been seen above, the Asia-Pacific Region still harbours a large contingent of poor people and it continues to rise as a whole and in most countries. Further economic growth is thus not only desirable but necessary. Preferably this growth would be more broadly based and more inclusive of marginal social groups, thereby spreading prosperity more widely and overcoming poverty sooner and already at lower levels of GDP/capita.

More and more political and economic decision makers in the region have come to realize that the paradigm of 'grow now, clean up later' mostly adhered to so far is problematic even in the short term given its high social and environmental cost. In the longer term and especially from an intergenerational perspective, it looks simply unviable.

The environmental threats to development in the Asia Pacific region, compounded by climate change itself, the adaptation to it and efforts to mitigate further change will lead to major transformations of production and consumption patterns. Numerous efforts are being made at national, local and enterprise levels to shift to a model of green growth and clean development. This shift involves progressing in stages from conventional pollution control to 'eco-efficiency' using fewer resources and further to 'eco-effectiveness' where production and consumption cause no pollution or environmental degradation. The ultimate goal are sustainable economies which can function without exceeding natural limits and which preserve the natural systems which are critical to support life on Earth.

This second great transformation will cause profound shifts and transitions in labour markets and in the way people earn a living. Pressure to reduce emissions and resource use will imply a drive to improve resource productivity in addition to labour productivity. Employment impacts will be significant, including major opportunities for green jobs.

The latter is essential. The rationale for green growth and clean development has mostly been presented as a win-win situation for the environment and for economic development. Relatively little and superficial attention has been paid to the social dimension of sustainable development. Labour markets are vital not only for production and the generation of wealth, but equally for its distribution. Income from work plays a prime role in poverty reduction and sharing the benefits of economic growth. Beyond its vital economic role for countries, enterprises, families and individuals, work enables individuals to build identities, to participate and to contribute to society. Gainful employment therefore also enhances or threatens to disrupt social cohesion and stability. The following sections consider some of the repercussions of the great transformation to green economies on employment and incomes.

2. Decent Work for sustainable development

What are green jobs? A definition

Green jobs as defined by the ILO-UNEP initiative is decent work created in economic sectors and activities, which reduces their environmental impact, ultimately leading to environmentally, economically and socially sustainable enterprises and economies.

This includes jobs that help to reduce the consumption of energy and raw materials, decarbonizes the economy, protect and restore ecosystems and biodiversity and minimize the production of waste and pollution.

Green jobs can lead to lower environmental impacts directly e.g. in the transport sector as railway or subway operators providing energy efficient mass transportation or indirectly e.g. as technicians in industry or logistics managers in services reducing energy consumption in manufacturing and delivery of services.

The range of profiles of green jobs is as extended as it is for other jobs: It stretches from highly skilled research and development or management functions through technical and skilled worker levels to relatively low skilled worked.

The largest numbers of already existing and future green jobs is concentrated in sectors and directly linked to the use of energy and the recovery of raw materials:

- Improvements in energy efficiency, particularly in the building sector (renovation), but also industry and transport
- Renewable energy
- Mobility: mass transportation
- Recycling and reuse
- Sustainable use of natural resources: agriculture, forestry and fisheries
- Environmental services

A paler shade of green?

The above definition allows for changes in environmental performance of economic sectors and activities over time and in the size of the environmental footprint that can be considered sustainable. Arithmetically, any new job in a sector which has a lower than average environmental footprint, contributes to improving the overall performance, albeit perhaps only marginally. This poses a problem to those who set out to inventory and monitor the numbers of green jobs.

In order to limit the count of green jobs to those with more significant contributions, thresholds can be used. The latter may be subject to change and jobs associated with achieving these thresholds may be transitional. An example would be workers assembling hybrid cars or cars with less than say 120 g/km of CO2 emissions. While both types of cars contribute significantly less to greenhouse gas emissions that the road transport sector on average, they are not sustainable if transport volumes continue to rise as projected.

While the different shades of green complicate accounting, it will be argued in the following that this is not a major problem. The real significance of green jobs is not in the volume of direct green jobs that are being created but in the way they transform the economy and the labour market.

Green jobs and decent work

A consideration of the kinds of jobs that satisfy the above definition of 'green' suggests that there is another caveat regarding green jobs which is more significant than the extent to which a particular job contributes to making the economy more environmentally sustainable. This is the quality of jobs that are sometimes considered green because they reduce environmental impacts, but hardly decent work and thus not compatible with sustainable development.

Decent work has been defined by the more than governments, employers and workers' organizations from over 180 countries which make up the International Labour Organization as 'decent and productive work in conditions of freedom, equity, security and human dignity'. Decent work combines adequate income from productive work with social security, with a respect for worker and social rights and with voice and the opportunity to defend interests collectively.

Many green jobs in recycling, construction or in the biofuels sector for example are currently not decent work. Recycling is often precarious employment, involves serious occupational as well as public safety and health hazards and generates less than living wages and incomes. Feedstock production for biofuels also can involve excessive work loads, exposure to hazardous chemicals and even the violation of fundamental rights such as the use of child and slave labour.

Green growth and clean production are part of an overall drive towards production and consumption patters which are compatible with sustainable development. It is one of the key challenges in the transformation to clean development to ensure that the potentially green jobs associated with it are truly sustainable, i.e. decent work which also reduces environmental impacts and contributes to environmentally as well as socially sustainable development.

3. Clean development, green growth and labour markets: opportunities, potential, challenges

Opportunities

The Green Jobs report being prepared for UNEP (Worldwatch Institute, forthcoming) and earlier, more limited ILO reviews of available evidence (CSPC forthcoming) find major potential for the creation of direct green jobs in a number of sectors.

Energy efficiency gains have historically been one of the biggest contributors to reductions in emissions (UNFCCC 2007). They will require the transfer and deployment of new technology. Much of the capital stock of buildings and equipment is long-lived and has slow renewal rates. The significant and often low cost contributions from improvements in existing processes and facilities can only be achieved by the active involvement of managers and workers.

Gains in energy efficiency which do not require major investments will be particularly important for small and medium-sized enterprises. The IPCC emphasizes that these represent the bulk of employment and manufacturing capacity in developing countries (IPCC WG3). They account for half of the exports of China for example. Approaches for reducing emissions without endangering competitiveness and employment will be particularly essential.

Energy efficiency gains are often the result of investment in better technology, but there is a large and often untapped potential for improving working methods and procedures. Joint initiatives by employers and workers for 'greening of workplace' can lead to significant improvements in energy efficiency and resource use with little or no capital investment and at low overall cost. There are numerous examples of such schemes reducing consumption by 15 per cent or more.

Gains in energy efficiency can be achieved in all sectors, but the potential is particularly large in industry, transport and most of all in construction. Energy efficient mass transportation is more employment intensive than mobility relying on private cars.

Buildings consume the largest share of total energy. The typically account for 30-40 per cent of demand and a similar share of GHG emissions. According to the IPCC WG 3 (2007) buildings also have the highest potential of all sectors to reduce emissions. The energy efficiency of buildings can easily be improved by 50 per cent and more. In many countries zero or negative energy houses will become the building standard in the near future increasing the cost of new construction by as little as 5-10 per cent (WBCSD 2007).

Over 80 per cent of the energy is consumed during the useful life of the building which tends to be 60-100 years. The building stock in most countries is therefore relatively old. Renovation of these older buildings is labour intensive and requires customized work typically provided by local enterprises.

More than half of the energy savings potential in buildings is in developing countries and almost a third of the emissions reductions carry negative net cost, i.e. they pay for themselves through the savings on the energy bill. Germany has been recently further expanded fourfold a renovation programme which had already been in place for a number of years. Under this programme – probably the largest worldwide- every €1 billion invested in the building stock safeguards or creates around 25,000 jobs (BMU 2007). The social partners in the construction sectors played an active role in the design and implementation of the programme.

In addition to the employment potential, energy efficiency measures can contribute to poverty alleviation. Poor households tend to spend disproportionate shares of their incomes on energy for electricity, heating and transport. Efficiency gains often translate in improvements in real incomes for the poor.

Renewable energy represents perhaps the most typical, but certainly the most readily counted green jobs are found in renewable energy: wind, solar thermal and photovoltaic, small hydro, geothermal and bioenergy. The Green Jobs report concludes that there are at least 2.2 million jobs in equipment manufacturing, installation and operation of renewable energy already. Investment have been rising at 20 per cent per year and the employment in this sector could exceed 20 million jobs by 2030 (Worldwatch Institute forthcoming).

All forms of renewable energy have significantly higher employment elasticities than fossil or nuclear alternatives per unit investment, per unit installed capacity as well as per unit output. They also tend to concentrate employment less in the manufacturing and equipment installation phase and provide more continuous employment during operation and maintenance.

Bioenergy such as alcohol produced from starch or sugar and biodiesel derived from oil crops to be used as fuel for cars or wood and other biomass for power generation have the highest employment elasticities of all. Studies for India for example suggest that every hectare of energy plantation can generate as much as 1 full-time job.

These would be green jobs in most cases. In the tropics, and based on efficient feedstock crops and processing, bionergy can have a rather favourable energy balance and substantially lower emissions compared to fossil fuels. On the other hand, bioenergy tends to compete for agricultural land with food production and is often associated with low incomes and very poor job quality.

From a development and poverty alleviation perspective as well as in terms of environmental impacts, a much better use of biomass could be made rather than using it as a partial substitute for fossil transport fuel. Small-scale renewable energy including biomass could be used instead for decentralized power generation for the 1.6 billion or more people who currently don't have access to any modern form of energy. Project experiences demonstrate the improvements this brings to the quality of life

but also the employment and income from power generation itself but more importantly from new economic opportunities which open up once people have access to electricity or other forms of power.

Recycling and the circular economy are essential to gradually eliminate waste and to close the material cycle of production and consumption. Rising commodity prices make recycling more and more competitive and already account for a large proportion of the identifiable green jobs. Recycling of material which has been energy intensive to produce like metals, in particular aluminium, but also glass and paper significantly reduces energy inputs and emissions in production. In European countries recycling rates for such materials are 50-80 per cent. This contributes to protecting natural environments and has turned out to be a cheaper source of raw material than primary resources in many cases.

Total employment in recycling in China for example is estimated to be 10 million. A relatively recent but fast growing segment is the recycling of information technology products in China as part of a global production chain. In this case, as in ship-breaking in Bangladesh, very poor working conditions and serious hazards for health and the environment are widespread. Turning recycling into an opportunity for sustainable local development and into a source of decent jobs remains a major challenge.

More advanced approaches towards a circular economy form of recycling like remanufacturing and cradle-to-cradle production are still in their infancy. Several Japanese companies have been among the pioneers of this concept. Hardly any research appears to have been done on the implications of remanufacturing and cradle-to-cradle for employment. A European case study suggests that is could be twice as labour intensive and requires higher skills than conventional manufacturing (Worldwatch Institute forthcoming).

Sustainable management renewable natural resources is a key area from an environmental as well as from a food security and employment perspective. Agriculture and forestry are among the sectors most affected by climate change but have also been contributing substantially to greenhouse gas emissions. Conversion of forests for agriculture or other land uses has been responsible for 20-25 per cent of CO2 emissions. Emissions from deforestation rather than industry or transportation put Indonesia and Brazil among the countries with the highest emissions worldwide.

Rapid industrialization and urbanization in most of Asia notwithstanding agriculture will still account for 30 per cent of all employment in the region in 2015. In South Asia it will still employ 4 in every 10 workers. While agriculture and forestry are and will remain essential sources of livelihood they are also associated with high levels of poverty. In East and South East Asia 75-80 per cent of the extremely poor are concentrated in rural areas (World Bank 2007).

After decades of relative neglect dwindling food stocks are leading to renewed attention to agriculture and rural development. Major efforts are needed to develop agricultural and forestry production systems which provide decent incomes and livelihoods and at the same time reduce emissions, consume less water and maintain soil fertility and biodiversity.

Such sustainable production systems are likely to result in fewer but better jobs compared to the present. The employment loss could be partially compensated by new green jobs in natural resource rehabilitation and the provision of environmental services financed through transfers like the Clean Development Mechanism.

The above discussion shows that millions of green jobs exist already. Moreover, in areas like renewable energy the numbers are growing fast. A caveat to these findings is that most of the well documented green jobs are in industrialized countries and research on developing countries and on the Asia Pacific region is scant. On the other hand, it would appear that the same drivers and mechanisms are behind the transformation, which should lead to broadly similar outcomes in terms of job creation.

While identifiable green jobs are real and look set to be a growing source of employment into the future, an exclusive focus on the number of direct green jobs is misplaced. Their significance for the economy and for the labour market can only be assessed by taking a broader look at the transformation of the economy in which green jobs play a key role.

4. The labour market dynamics of green growth

There is more to green jobs than meets the eye

An understanding of the way green jobs affect labour markets needs to:

- put them into perspective and consider the proportions
- recognize the forward linkages of greening economic activity
- take into account the interactions of new job creation, substitution, destruction and transformation
- consider the often large effects via indirect and induced employment
- recognize the potential of green jobs for development and poverty reduction

The number of green jobs reported and expected to be created over the next years is substantial but it is modest relative to total size of national and global labour markets. If a full account of existing green jobs were to conclude that there are a 100 million, this would represent just over 3 per cent of the global labour force. That would still be significant if all green jobs ere new and additional employment, but typically they at least partially substitute for existing jobs. This is the case for example when jobs in renewable energy replace those depending on fossil fuels. As has been seen in above, the direct substitution effects of green jobs are often favourable as they tend to have higher employment elasticities.

In addition to direct substitution, policies to protect the climate and changes in relative prices reflecting resource scarcity lead to a loss of jobs in energy and resource intensive sectors which grow more slowly or even contract. Finally, green growth and clean production will transform many if not most jobs in the economy towards more energy and resource efficiency and less environmental impact. This will make existing jobs greener and change the content of jobs, the way work is performed and the skills of workers rather than replace them by with totally different green jobs.

Forward linkages of green technologies and green jobs have impacts on large sections of the economy and employment that are neither particularly brown nor green. A limited number of jobs in renewable energy for example substantially lowers the environmental footprint of the sector it supplies. The information technology sector for example is a still modest but rapidly growing contributor to greenhouse gas emissions. Powering the internet, computers in offices and mobile phones by renewable energy would turn this large economic sector into a low impact activity and make IT employment more sustainable. Electrical cars powered with photovoltaics for example would dramatically reduce the climate impact of transport. Green jobs in energy efficiency, reused and recycled materials and products have similar effects.

Indirect and induced employment effects are the key to understanding the net effects of a transition to a green economy on the labour market. Indirect effects refer to the inputs from other economic sectors which are mobilized by investments or expenditure in clean production. These upstream effects can be assessed at a national scale with the use of input-output tables or through tracking studies in the case of smaller investments.

Indirect employment tends to represent a significant part of the total employment generated, it may be equivalent or higher for clean production than for conventional. Where inputs are derived mostly

from imports, the employment associated with their production benefits the exporting country. If sources of inputs are domestic, indirect employment is created or maintained in the national labour market. This interaction is one of the factors which make renovation of buildings attractive as a national employment programme. Renewable energy also tends to lead to a higher domestic content in energy supply.

Induced effects are the result of changes in the economic cycle linked to clean production. Renewable energy for example substitutes for fossil fuels. It has higher direct employment effects than fossil and much higher than nuclear energy, but may result in at least temporarily higher cost of energy. Budget constrained enterprises, households and governments compensate this additional expenditure by savings elsewhere, reducing demand and employment.

The reverse occurs with energy efficiency measures as they reduce expenditure for energy which can be spent on other purchases. Almost any expenditure in the economy has a higher employment effect than expenditure on fossil or nuclear energy. On balance, the employment effects therefore tend to be positive. They do, however, need to be assessed carefully for any given investment or policy by comparing scenarios which take into account direct as well as indirect and induced effects. Ideally, the analysis should also factor in qualitative aspects, redistribution effects and gender dimensions. For a discussion of methodological approaches see a study commissioned by ILO (Wuppertal Institute, forthcoming).

5. A tentative list of challenges, resources and opportunities

Challenges

The preceding discussion has identified a number of challenges for understanding the implications of green growth on employment and income and for the promotion of green jobs:

- Anticipating net labour market effects: Economic transformations are complex. Impacts on labour markets can only be assessed as the net effect of the creation of additional jobs, substitution, elimination and transformation. We are not aware of such assessment in Asia.

- The impacts on small and medium-sized enterprises which are major employers are not well understood. Is there a risk of undesirable structural change in the economy from green growth policies, from energy and raw material prizes and from policy tools like the Clean Development Mechanism and technology transfer which tends to exclude smaller enterprises and local initiative?

- Skills will obviously play an essential role in making green growth possible. There are already shortages of professionals and skilled workers resulting in energy efficiency standards not being met, in slowing down improvements in energy efficiency as well as in the deployment of renewable energy and other high performance technologies. As the quantitative and qualitative changes in labour markets are so poorly understood, there is hardly any information on future skills needs and very few programmes in operation to meet these needs.

- Turning adaptation into an opportunity: In the absence of new social security systems, more frequent and severe natural disasters are likely to trigger or accelerate migration flows and could increase existing political tensions and instability. The response to such crises could help to make local societies more resilient if it aimed at adapting livelihoods rather than short-term disaster relief to return to the original situation.

The major investments into adaptation could offer significant employment and income opportunities in areas such as extending coastal defences, reinforcing buildings and infrastructure, water management and harvesting. Adaptation will require the transfer of numerous new technologies on a large scale. It will also involve the relocation of exposed settlements and industry. Adaptation in agriculture could have positive or negative impacts on employment and income depending on the labour inputs of new crops and farming practices and their compatibility with small holder farming.

- The potential contribution to development and poverty has been referred to in the foregoing discussion. Numerous case studies and initiatives in the Asia-Pacific region and elsewhere demonstrate that clean development and green jobs are not luxury goods but can be generated in ways that directly contribute to development and an improvement of the lives of those who need it most. Hardly any of these promising initiatives are implemented on a scale where they make a real difference.

- The need for just-transitions: The study carried out for ETUC (2007) concludes that a 40% reduction of carbon dioxide emissions in 15 European countries would result in net employment gain of 1.5%. There would be significant substitution, often within the same sector (e.g. power generation, transport) but to new locations and involving different job profiles.

Research by the ILO including a special literature review (CSPC forthcoming) has confirmed that there are only a limited number of quantitative assessments of the impact of mitigation measures on the labour markets and most of these concentrate on industrialized countries. Existing studies agree that a transition to a low carbon economy should not be a 'job killer' but rather lead to a net increase in employment. This typically small net gain is, however, the result of major labour market transitions with substantial losses of some jobs more than compensated by increases in others.

Most of these transitions are likely to take place within economic sectors such as power generation, energy intensive industries or transport. Outcomes for labour markets and the climate will be best if these transitions are anticipated and managed with the active participation of employers and workers.

The role of ILO constituents

Key political decisions about climate change are being made over the next 20 months as a new international climate regime for the period after 2012 is being drawn up. International trade unions, business leaders and employers' organizations have endeavored to connect the economic and social dimensions of development in international discussions, but the climate debate and negotiations as well as other fora tend to be dominated by environment and energy specialists.

The policy instruments that are being discussed such as 'cap and trade', carbon taxes, performance standards, subsidies, feed-in-tariffs, CDM, technology transfers and finance, public procurement and investment are likely to have substantial and differentiated impacts on national economies, on economic sectors and on labour markets.

Employment, enterprise development, income and poverty reduction are, however, usually secondary in these negotiations if not absent altogether. There is an urgent need for those responsible for social development to engage and to actively seek dialogue and partnerships with economic stakeholders like investors and environmental interests. It is encouraging that the G8 labour ministers will discuss green jobs at their meeting in Japan in May 2008.

There is also large untapped potential for social dialogue and alliances at national and sectoral levels to help resolve conflicts and to arrive at better informed and more integrated policy responses. One largely unexplored avenue is the link between green growth and green jobs in national employment and social security policies such as the India employment guarantee scheme or 'work for peace' in Nepal.

An example of a tripartite mechanism to facilitate such transitions is the national sectoral roundtables for the implementation of the Kyoto commitments in Spain.

Finally, the social partners could make a major contribution at the enterprise level through massive efforts to green workplaces.

Relevant ILO work

Work on green jobs is still in its infancy but a number of relevant research and development activities have been carried out or are under way under the ILO green jobs initiative with UNEP and other partners:

- The Green Jobs report prepared by the Worldwatch Institute is to be published in June 2008.
- Mapping labour market impacts: an analysis of methodological options has been prepared and first application is planned as part of a larger UN project in China.
- Energy efficiency in buildings in developing countries and emerging economies: an initial background study has been completed. An in-depth country study for South Africa
- Energy efficiency and SMEs: some background work has been done by the Enterprise Department of the ILO. Country level work is scheduled as part of the China project.
- Skills development: a preliminary review has been carried out for the report on skills to be discussed at the International Labour Conference in June 2008. A more in depth report based on country experiences is planned.
- Adaptation to climate change - impacts in rural areas: together with FAO, ILO plans to develop a methodology to factor employment into national plans and programmes for adaptation to climate change. One of the countries where the methodology is to be tested is Bangladesh.
- Bioenergy and smallholder farming: the ILO has been developing tools to assess the employment and income impacts of biofuels in Brazil. It has been requested to assist the Government of the State of Bahia with the design of a sustainable biodiesel programme to improve livelihoods of smallholder farmers.
- Documentation of good practices: a study on the role of the social partners in the implementation of the Kyoto protocol in Spain has been completed. Other case studies related to the role of social dialogue and to green jobs for development are under way.
- Training module on green jobs: together with the ILO International Training Centre in Turin a first training module on green jobs will be developed until the end of 2008. It will be primarily aimed at ministries of labour, employers' organizations and trade unions.

Some concluding questions

This paper has thrown up more questions than it has answered. The following may serve as a starting point for the discussions at the conference.

- Green growth and green jobs are obviously very relevant concepts for the future of Asia-Pacific region, but too little is still known about the dynamics and the impacts. Are the employment and income balances in Asia similar to those in Europe and the United States?

- Are the mechanisms at work in developing countries and emerging economies similar to those observed in industrialized ones and will the lead to the comparable labour market outcomes?
- What do practicable pathways look like for the emerging and developing economies in Asia and the Pacific which make green growth and preserving an intact environment compatible with social development with overcoming poverty?
- In particular: in which sectors are the key opportunities for development, employment and income creation through green growth and green jobs? What approaches, policies and programmes look promising to tap this potential?
- How will environmental and climate policies affect labour markets, including through trade and competitiveness and what would be the repercussions of different policy regimes for employment and incomes?
- What can be done to improve the integration between green growth and social and labour policies and programmes?

References

BMU (2007) What is the German government doing to boost energy efficiency? German Environment Ministry (BMU)
http://www.bmu.de/english/energy_efficiency/buildings/doc/38270.php

CSPC (forthcoming) Centre for Sustainable Production and Consumption

EIA (2007) Annual Energy Outlook 2007 with projections to 2030, Energy Information Agency (EIA)
http://www.eia.doe.gov/oiaf/aeo/index.html

ILO (2007) 'Visions for Asia's Decent Work Decade: Sustainable Growth and Work, Beijing, China, 13-15 August 2007; ILO ROAP, Bangkok, 28p. Jobs to 2015'; document presented to Asian Employment Forum: Growth, Employment and Decent

ILO Governing Body (2007) 'Decent work for sustainable development – the challenge of climate change', GB.200/WP/SDG/1, ILO, Geneva, November 2007

IMF (2008) 'World Economic Outlook 2008', International Monetary Fund, Washington D.C., Chapter 5.

IPCC WG 1 (2007) 4th Assessment Report, Intergovernmental Panel on Climate Change Working Group 1, 2007 (IPCC WG 1)
http://ipcc-wg1.ucar.edu/wg1/wg1-report.html

IPCC WG 2 (2007) 4th Assessment Report, Intergovernmental Panel on Climate Change, Working Group II, 2007 (IPCC WG 2)
http://www.ipcc-wg2.org/

IPCC WG 3 (2007) 4th Assessment Report, Intergovernmental Panel on Climate Change, Working Group III, 2007 (IPCC WG 3)
http://arch.rivm.nl/env/int/ipcc/pages_media/AR4-chapters.html

UNEP/ILO/ITUC (2008) 'Background paper on Green Jobs' UNEP, Nairobi, 20p.

UNFCCC (2007) Estimates of investment and financial flows for mitigation in 2030 by Erik Haites and GHG mitigation interventions - How far feasible in India. United Nations Framework Convention on Climate Change (UNFCCC) Fourth Workshop, August 2007, Vienna. http://unfccc.int/meetings/dialogue/items/4048.php.

Worldwatch Institute (forthcoming) 'Preliminary report: Green jobs – Towards Sustainable Work in a Low-carbon World', December 2007 at
www.unep.org/civil_society/Publications/index.asp/

World Bank (2007) 'East Asia and the Pacific update: Ten years after the crisis, sustainable development in East Asia's urban fringe' , World Bank, Washington D.C.