

Park-
scheine

Module 2: Consequences of climate change on employment



© P. Frischmuth - UNEP / Still Pictures
Postman in flooded street, Germany



MODULE OBJECTIVES:

The module aims at:

- Providing information on existing and potential medium/long term effects of climate change on employment;
- Analysing the effects of strategies against climate change, namely mitigation and adaptation, on employment.

LEARNING OUTCOMES:

At the end of the session, the trainee will be familiar with:

- The potential impacts of climate change on employment in different regions and strategic sectors;
- The need to integrate employment in designing climate change mitigation and adaptation strategies.



INTRODUCTION TO MODULE 2

Climate change seems to be just another of the many environmental problems facing mankind. However, studies have confirmed the increasing number of its impacts on all aspects of human lives. The previous module studied the impacts of climate change on the economy, on livelihoods and its linkages with development dynamics. This module will examine how employment would be affected by climate change; by policies aiming at adapting to it as well as by mitigation policies and measures aimed at tackling this problem.

Unfortunately, research in these three areas is scarce. It is easy to state that when the economy is affected, employment is as well. However, it is hard to predict how these impacts will be distributed, as impacts on the economy might not bring about immediate, visible changes in employment as a whole. Instead, some sectors will be adversely affected by these changes while others will benefit from them.

This second module is a first attempt to understand the kind of impacts on employment expected from climate change mitigation (i.e. policies who look for reducing greenhouse gas emissions) and adaptation policies (i.e. those who try to anticipate a response to climate change consequences) by examining their effects on different sectors from an environmental, economic and political perspective. It is meant to present tendencies and not net gains and losses.

The **first unit** will highlight that the impacts of climate change on employment remain mostly unexplored by science. It however addresses the possibility to identify many sectors where job losses could be expected due to extreme weather events and increase in temperature (the first having greater relevance). It will also address the issue of loss of employment in climate-sensitive sectors such as agriculture, fisheries and tourism, especially in developing countries - in Africa and Asia in particular.

The **second unit** will review how adaptation strategies can help prevent job losses and even create new job opportunities in vulnerable regions, and why economic diversification policies seem essential. It points out that the most likely immediate sources of jobs creation will be in infrastructure development and health services, at this initial stage of adaptation investments. The degree of economic diversification will determine the positive and/or negative impacts on employment for other sectors.

The **third unit** will explore why mitigation strategies are necessary to reduce future climate risks, but also to make today's adaptation strategies viable. Mitigation strategies could be a source of job creation in sectors such as energy efficiency, renewable energy, building restoration and regeneration, or public transportation. Mitigation activities will also give rise to stress in certain sectors i.e. those related to fossil fuels or energy-intensive industries and services. The unit will review the measures aimed at reducing the vulnerability and protecting workers in these sectors through re-training, social protection and local economic diversification in affected sectors and zones.

UNIT 1: EFFECTS OF CLIMATE CHANGE ON EMPLOYMENT

KEY IDEAS

- The impacts of climate change on employment remain mostly unexplored by research.
 - However, it is possible to identify many sectors where we can expect job losses due to extreme weather events and increases in temperatures (the first having greater relevance).
 - Loss of employment in climate-sensitive sectors, such as agriculture, fisheries and tourism seem very likely, especially in developing countries - in Africa and Asia in particular.
-

Based on the last review of the IPCC (2007), unit 1 will provide:

- a brief summary of the key climate trends;
- their likely impacts on different sectors; and
- indicative trends for employment impacts.



Impacts will aggravate if we do not take action against climate change!

The table at the end of this unit presents a selection of climate phenomena and trends, and summarizes the expected effects on three areas: agriculture and ecosystems, health, and human settlements and society. These changes are ongoing and are set to go on evolving even if we were to stop emitting greenhouse gases today. However, we can also expect they will be stronger and more damaging to the environment, health and economic activities if larger quantities of GHG are further released into the atmosphere. This table also points out the link with a variable/factor that is little understood: employment.

LINKING EXPECTED CLIMATE CHANGE IMPACTS TO THE EMPLOYMENT VARIABLE

The table presented in box 2.1. clearly indicates that the impacts on employment in the short- to medium-term will not be due to temperature increases, as these will basically be moderate and might even have positive impacts, for example by increasing agricultural yields. Instead, negative impacts on employment are likely to arise from extreme weather events such as droughts, cyclones and/or floods. They will also arise from slower processes such as sea level rise.

Assuming a greater incidence of heavy precipitations and the damage to crops this will entail, it is anticipated that employment in the agricultural sector will be adversely affected, especially seasonal jobs that depend on harvesting and crop-processing. The greater incidence of floods will also affect urban employment, in as far as damages to transport, industrial infrastructures and settlements will affect the ability of workers to be present at their workplaces and/or find alternatives when workplaces should have to close. An example to illustrate this was the practical destruction of New Orleans (USA) by Hurricane Katrina, which resulted in the loss of about 40,000 jobs.

Another anticipated impact is the displacement of workplaces to areas less exposed to environmental risks (for example, further away from the sea, or in zones less prone to cyclones). In the context of a globalized economy, it is even harder to predict whether these displacements would take place within the same country or could be transboundary.

Increases in respiratory and/or water and food related diseases, and the risk of malnutrition will also negatively affect employment. These health related impacts will certainly affect workers' productivity as well as conditioning the future incorporation of young workers into the workforce, due to irreparable damages to their health caused during their childhood. Increased migration and mortality will further aggravate problems such as worker turn-over and the loss of qualified workers, which is of special concern as technical knowledge is essential in order to adapt to changing working conditions.

WHICH REGIONS ARE MOST VULNERABLE TO EMPLOYMENT LOSSES?

As the first module explained it, although some regions will be the first to be hardly hit, the whole planet will ultimately be affected by climate change. Regarding impacts on employment, two elements are important in determining the vulnerability of a country or region:

- **Physical factors:** countries and regions in tropical and sub-tropical areas, and those near the poles will be the first to be affected by increases in temperatures.
- **Socio-economic factors:** the weight of climate-sensitive activities in the economy (such as agriculture and fisheries) and the capacity of human settlements to resist to climatic events are key to understanding each country's vulnerability.

Taking these elements as a starting point and based on scientific information, we know that Africa and South East Asia are more vulnerable to adverse effects of climate change. As mentioned in Module 1, these regions will suffer from water stress, reduced agricultural yields and food supply, increased flooding, and exacerbation of endemic diseases.

This does not mean that other regions of the world will not be affected. In these cases however, the effects are likely to appear later in time or be extremely severe, and focused on very specific areas (as might be the case with the Caribbean in the Americas region). In these countries, jobs in strategic sectors such as tropical agriculture will be particularly at risk.

AFRICA

In Africa, climate change will affect agricultural production through increased water stress, reduced suitable areas for production and decreased yield potential. Jobs in the rural areas will be affected, not only because of the direct reduction in agricultural production, but also from indirect effects in rural economies, through the knock-on effect on the processing sector, private transport services to the cities, and non-agriculture related commerce that depends on the revenues of this activity (i.e. small shops in rural communities).

As an example, an increase of only 2°C would make areas of Uganda unsuitable for coffee production; this in a country where the coffee sector is the most important exporter and one of the biggest employers.¹²

Fisheries are a major source of work in Africa, where this industry employs up to 10 million people. In some areas, a large proportion of the population is involved in fishing. A study in Tanga (Tanzania), found that 70-80% of men were involved in it. Migrant fisheries may employ agricultural workers as crew, providing seasonal employment and contributing to village economies. Fisheries will be affected by a drastic reduction in resources due to rising water temperatures, exacerbated by continued over-fishing. Mangroves and coral-reefs are also expected to be affected, producing further consequences for this sector. Job losses are to be expected if measures are not taken to preserve resources or adapt economic activity.

Projected sea-level rise in coastal areas, where most African capitals are located, and the greater risk of floods will affect urban employment and increase stress to transport and infrastructure, many of which are already under pressure because of unplanned urbanisation and lack of public services.

ASIA

Up to 60% of the income of rural households in Asia is directly related to agriculture production, while the rest comes from waged-jobs in the same sector. Thus, rises in the frequency of floods or decreases in freshwater availability are likely to affect the two main sources of income of these households. The development of the Asian region will be subject to an increased water stress; it is predicted that up to one billion people will be affected by 2050.

Coastal areas, especially heavily-populated mega-delta regions, will be at greater risks due to increased floods and sea-level rise, which will also raise endemic morbidity and mortality due to diseases such as diarrhoea or cholera. Not to mention the damage to infrastructure, like roads and power lines, and the subsequent disruption of economic activity and reduction of worker's income. A storm in Karachi (Pakistan) killed 200 people, mostly poor workers living in densely populated areas with precarious housing. This is an illustration of workers not only losing jobs, but their lives as well. Another dramatic example is the Cyclone Sidr which struck the coastal and central areas of Bangladesh on the 15th of November 2007,

¹² ILO (August 2007). "Green jobs: Climate change in the world of work." World of Work. No. 60

with winds of up to 240 kilometers per hour. The cyclone caused over 3,400 deaths, injured over 55,000 persons, and destroyed houses, crops, livestock, trees, educational facilities and infrastructure. According to an assessment made by ILO and the Ministry of Labour and Employment of Bangladesh, livelihoods were affected mainly due to the damage to income-generating assets, and loss of employment and income. A total of 567,000 people were temporarily or permanently affected in their employment. This figure corresponds to 436,000 households, which represents 14% of all houses in the affected area.¹³

LATIN AMERICA

In Latin America, increasing temperatures and decreases in soil water in the eastern Amazonia will result in savanna gradually replacing tropical forests by 2050, and arid-land vegetation replacing semi-arid vegetation. Both these cases are example of changes to tropical areas which will result in a significant risk of biodiversity loss (see Module 1 for further information).

An obvious linkage between biodiversity and employment is through tourism. In Guatemala, forests are one of the main tourist attractions. The travel and tourism economy there accounted for 7.2% of GDP and 257,000 jobs in 2007 (6.3% of total employment). In the medium term, these jobs could be at risk if natural environments are not protected against changes in climate.

In drier areas, climate change is expected to lead to salinisation and desertification of agricultural land. Productivity of some important crops and livestock is projected to decline, with negative consequences for food security. Agriculture still accounts for 17% of the global employment share in Latin America and the Caribbean. However, the precise impact of these slow-changing trends on employment is more difficult to assess.

In temperate zones, soybean yields are projected to increase. However, due to the moderate labour-intensity of this activity major positive impacts on employment are most unlikely.

Sea level rise will increase the risk of flooding in low-lying areas. Additionally, increases in sea surface temperature are projected to adversely affect Mesoamerican coral reefs and cause shifts in the location of south-east Pacific fish stocks. This movement of the resource could affect negatively more than 60 thousand people working as fishermen and fish farmers.



While the effects of climate change on employment may seem unavoidable, it is important to remember that political choices can affect its outcomes, particularly through adaptation and mitigation.

¹³ ILO, (March 2008). "Cyclone Sidr. Preliminary assessment of the impact on decent employment and proposed recovery strategy".

Box 2.1 Selected environmental consequences of climate change and examples of major projected impacts by sector

Phenomenon and trend	Examples of major projected impacts by sector		
	Agriculture, forestry and ecosystems	Human health	Human settlements and society
Over most land areas; warmer and fewer cold days and nights; warmer and more frequent hot days and nights.	Increased yields in colder environments; decreased yields in warmer environments; increased insect outbreaks.	Reduced human mortality due to less exposure to the cold.	Reduced energy demand for heating; increased demand for cooling; declining air quality in cities; reduced disruption to transport due to snow and ice; effects on winter tourism
Positive and/or negative impacts on employment identified	- +	+	- +
An increase in the frequency of warm spells and heat waves over most land areas.	Reduced yields in warmer regions due to heat stress and an increase in the risk of wild fires.	Increased risk of heat-related mortality, especially for the elderly, chronically sick, very young and socially-isolated.	Reduction in the quality of life for people in warm areas without appropriate housing; impacts on elderly, very young and poor.
Positive and/or negative impacts on employment identified	-	-	-
An increase in the frequency of heavy precipitation events over most areas.	Damage to crops; soil erosion, inability to cultivate land due to water logging of soils.	Increased risk of deaths, injuries, infectious, respiratory and skin diseases.	Disruption of settlements, commerce, transport and communities due to flooding; pressures on urban and rural infrastructures; loss of property.
Positive and/or negative impacts on employment identified	-	-	-
Areas affected by increases in the frequency of drought.	Land degradation; lower yields and/or crop damage and failure; increased livestock deaths; increased risk of wildfire.	Increased risk of food and water shortage; increased risk of malnutrition; increased risk of water and food-borne diseases.	Water shortages for settlements, industry and communities; reduced hydropower generation potentials; potentially, population migration.
Positive and/or negative impacts on employment identified	-	-	-
An increase in intense tropical cyclone activity.	Damage to crops; windthrow (uprooting) of trees; damage to coral reefs.	Increased risk of deaths, injuries, water- and food-borne diseases; post-traumatic stress disorders.	Disruption by flood and high winds; withdrawal of risk coverage in vulnerable areas by private insurers; potential for population migrations; loss of property.
Positive and/or negative impacts on employment identified	-	-	-
Increased incidence of extreme high sea level (excludes tsunamis)	Salinisation of irrigation water, estuaries and freshwater systems.	Increased risk of deaths and injuries by drowning in floods; migration related health effects.	Costs of coastal protection versus costs of land-use relocation; potential for movement of populations and infrastructure.
Positive and/or negative impacts on employment identified	-	-	-

Source: IPCC, 2007 and regarding employment, Sustainlabour, 2008

UNIT 2: EFFECTS OF ADAPTATION ON EMPLOYMENT

KEY IDEAS

- Adaptation strategies can help prevent job losses and even create new job opportunities in vulnerable regions.
 - The extent of positive impacts will depend on governments' commitment to these policies, but also on the level of emissions reduction achieved. If emissions rise by more than 2°C, our capacity to adapt in the future will be severely reduced.
 - Economic diversification policies are essential, but they have to take into account the consequences on employment of changing the economic activity, and evaluate training and other transitional needs.
 - Significant sources of jobs creation could be in infrastructure development and health services, at this initial stage of adaptation investments. The degree of economic diversification will determine the positive and negative impacts on employment in other sectors.
-

The previous unit identified areas where jobs losses could be expected because of climate change. This unit will highlight that taking measures now to combat climate change could not only be a way to avoid the aforementioned jobs losses, but also a strategy for creating new sources of employment.

Far more regional, sectoral and local research is needed to understand the effects adaptation measures can have on employment. Nevertheless, we can safely say that adaptation strategies, by improving societies' and economies' capacity to react and adapt to climate change, do not in essence have a negative impact on employment.

Having said that, it is fair to note that policies aimed at adaptation to climate change in different productive sectors need to take into account the labour-intensity of the output product that is being substituted, in order to avoid conflicts between short-term income needs for workers and mid- to long-term policies. If policies adopted and implemented promote the substitution of a product by another because it is more economically and environmentally viable, as well as less labour intensive, then policy makers should acknowledge the potential job losses and its impacts on the local economy.

Policy makers should also be aware of the cultural aspects of such a decision, as some products could have an added value to local communities, related to, for example, culinary, ancestral or religious traditions.

Box 2.2. "Facing the social impact of climate change"

"(...) Farmers are changing their agricultural practices, sometimes switching to entirely new crops. So far most adaptations in farming systems have related to agronomic practices like seed selection and irrigation and to the economic viability of alternative crops. There can also be significant shifts in employment and income opportunities. A recent FAO study in semi-arid Bangladesh found that mango is a good alternative to rice from an agronomic and an economic point of view. But the prospects for employment are less encouraging: mango requires much less work than rice and labour demand is highly concentrated in two short periods per year. That is bad news for the one third of households in the region who depend on work as daily labourers in agriculture.

Should the government assist the move into mango? If so, what could it do to assist the landless agricultural labourers?

This example shows that effective adaptation policies and programmes require a much better grasp of the problem and of options for tackling it. The "hotspots" need to be identified more clearly, i.e. the areas, sectors and population groups which will be most affected. The nature and dynamics of these effects need to be understood. (...)"

Source: Extract from ILO (August 2007). "Green jobs, Facing up to "an inconvenient truth"", World of Work. No. 60

In this case, if policy suggests substituting rice or fisheries for another agricultural product, which might be more economically and environmentally viable but needs less labour for its production, then those responsible for the policy must be aware that it can cause major local unemployment problems. What is needed is a set of transitional measures for workers affected by the change in production, designed with the participation of workers and their representatives, and adopted at the very beginning of any adaptation measure.

While climate change will generally have negative effects on employment, some adaptation measures can counteract these effects and help create new jobs.

COMBATING CLIMATE CHANGE AND CREATING NEW JOBS: THE VIRTUOUS CIRCLE?

As it has been previously explained, vulnerability to climate change is a direct consequence of poverty. Poor people have little means for planning and implementing adaptation strategies in view of the changes that will be taking place in their jobs - notably in the informal economy -, in their homes - often in slums or extremely precarious housing -, or within their families - for example with regards to the health effects of climate change. Ambitious adaptation policies can create local jobs which, if decent wages are given, could increase workers' wealth, and by doing so, reduce their vulnerability. This virtuous circle, Adaptation policies ⇒ Job creation ⇒ Wealth increase ⇒ Vulnerability reduction, needs to be explored and enhanced.

Table 2.4 presents a set of adaptation measures that could have an impact on employment, and focuses on those sectors that are most at risk and where adaptation is most important. These are agriculture, forestry and ecosystems, health and human settlements.

While climate change will, generally speaking, affect these areas negatively, if it is accompanied by adaptation measures, it can result in some positive effects on employment, or, at least, less severe negative ones. Adaptation measures vary by sector, but all of them should include provisions for workers whose jobs are at risk from changes in production needed to prepare our society and economy for the impacts of climate change.

In the previous unit we gave the example of coffee workers in Namibia whose job is at risk due to climate change. This is just one of many cases. In certain countries, rice fields will have to be replaced by other forms of agricultural production. Unfortunately, given the large number of workers in the rice sector it will be hard for policy-makers to find an alternative which will not only be able to withstand changes in weather patterns, but also provide sufficient employment and guarantee a fair market price.

In both examples the appropriate measures should guarantee a fair transition for potentially affected workers. These measures must include:

- **Social protection systems, including health coverage**

As it is developed in the third module, access to an adequate level of social protection is recognized as a fundamental right for all individuals in the Philadelphia Declaration, in subsequent ILO declarations and in a number of international labour standards. Yet in many countries, especially developing countries, the reality falls extremely short of these ideals. Social protection is the tool modern societies have developed to deal with the vulnerability of some sectors of their population. Social protection systems must run in parallel to adaptation efforts as they can diminish vulnerability to climate change and strengthen the social security systems, especially in developing countries.

As stated by the ILO, social protection needs to adapt in order to deal with contemporary issues, and climate change is without doubt an important one among these.

- **Economic diversification policies, able to identify potential job opportunities**

Economic diversification policies aiming at increasing the economic resilience of, and reducing reliance on, climate-sensitive sectors such as agriculture, fisheries and tourism seems imperative in certain regions. They are essential for ensuring the continuity of the regions' economic activity.

Economic diversification policies could be organized within the sector (by changing the agricultural output, by developing different tourist activities) or by the promotion of new activities from other economic sectors (by shifting from agriculture to the climate-insensitive industry and service sectors). Decisions on this issue need to be taken with regards to the expected impacts of climate change in concerned zones. A consultation of local stakeholders (workers, farmers, community leaders,

14 ILO (1944). "Declaration of Philadelphia on the aims and purposes of the Organization."

among others) is key in order to understand as much as possible the impacts of this transition, and to integrate local knowledge about possible diversification opportunities.

Direct economic viability of proposed production outputs needs to be completed by the analysis of impacts on employment (shifts in production could generate drastic increases or decreases in workforce needs), on local cultures and traditions, among others.

- **Training and re-qualification programmes to help workers incorporate new branches**

It will be impossible to ensure workers a decent and sustainable life without preparing them for new jobs, through new qualifications and training opportunities. These should be anticipated as workforce training belongs to a mid- to long-term strategy. Economic diversification policies mentioned above need to foresee workforce training, in order to ensure that policies will be for the benefit of the local community.

Adaptation could also provide positive opportunities for sectors at risk and might even help to improving workers' education and income. The example of the Lesotho's National Adaptation Action Plan (NAPA) illustrates this perfectly well. All adaptation measures are analyzed according to their impact on employment and on poverty reduction, and the country only chooses those with positive outcomes in these two areas. This is to be commended since unemployment and poverty are the major challenges facing the country.

Adaptation strategies in developing countries are still few and relatively small in scale. It is to be expected that countries develop them further. In this development, social and employment issues need to be addressed in order to improve adaptation policies' impact on development and vulnerability. Civil society, and in particular trade unions and workers have the possibility to improve governments understanding of these issues and need to participate in the design and implementation of these strategies.

Generally speaking, we can observe two kinds of adaptation policies according to their positive effects on employment:

- Policies that **avoid job losses** by changing the element in production affected by climate change (i.e. changing crops);
- Policies that **create jobs** by preparing the country for climate change, engaging in labour-intensive projects (i.e. big infrastructure projects).

How can adaptation prevent job losses?

In the agriculture and forestry sector, where climate change is expected to reduce yields and damage crops, erode soils and increase livestock deaths, adaptation policies need to focus on expanding non-farming activities and farming crops that are able to face greater variability in weather conditions. These policies will reduce negative impacts of climate change on this economic activity and on related employment.

Box 2.3. Extracts from the Lesotho's National Adaptation Programme of Action (NAPA) on Climate Change

Criteria for selecting priority activities

A Multi-Criteria Analysis technique was applied in prioritizing adaptation options. The methodology involved: identification of options, scoring the options against selected criteria and weighting the criteria. Six criteria among those used to prioritize the country's needs were selected as the most appropriate for Lesotho. This selection was made in the context of the major developmental challenges facing the country (environment degradation, unemployment, poverty, gender equity, and HIV and AIDS) as well as the policies and programmes put in place to combat the challenges. The overriding consideration in selecting and prioritizing the criteria was the degree of focus on the uplifting of the vulnerable groups and enhancement of their capacity to adapt to climate change.

The criteria are as follows:

1. Impact on Vulnerable Groups and Resources (...)
2. Impact on the Economic Growth Rate of the Vulnerable Communities (...)
3. Impact on poverty reduction (...)
4. MEA synergies (...)
- 5. Employment Creation**

Unemployment in Lesotho stands at 40 percent. The situation is likely to degenerate further as more migrant workers are retrenched from the mines in South Africa, textile factories are closed following the expiration of the Multi-Fibre Agreement and the termination of AGOA in 2015.

Unemployment is the highest cause of poverty in Lesotho hence it is regarded as a high priority challenge for poverty reduction especially among the rural communities.

6. Prospects for Sustainability (...)

Scoring of Options (Activities) and Weighting of Criteria

Allocation of scores for the options (activities) against the criteria, and allocation of weights to the criteria (prioritization of criteria), and hence identification of priority activities for the country, were attained through a rigorous consultation process.

(...) **The criteria of Employment Creation and Impact on Poverty Reduction received the highest and second highest weights respectively. This is hardly surprising since unemployment and poverty are the major challenges facing the country.**

Source: Lesotho's National Adaptation Programme of Action (NAPA) on Climate Change. Ministry of Natural Resources. Meteorological Services.

For the complete Lesotho NAPA: <http://unfccc.int/adaptation/napas/items/2679.php>

With regard to human health climate change is expected on the one hand to:

- Reduce workers' productivity by increasing mortality and morbidity because of the resurgence and proliferation of certain diseases;
- Degrade working conditions of workers who carry out their activity outdoors, such as building workers for example, because of rising temperatures.

In these cases adaptation policies need to improve legislation regarding occupational health and safety and/or expand health services to the most vulnerable groups. This can have a positive impact on employment and income in affected communities.

In the tourism sector, the vulnerability of workers can be reduced with policies that focus on the development of different tourist activities or promotion of economic diversification.

How can adaptation create jobs?

In the agriculture and forestry sectors, the expansion of non-farming activities, establishment of tree nurseries and promotion of local technologies are examples of policies that can help adapt to climate change and create numerous job opportunities. The last two initiatives are well known for their potential to empower poor people, in particular women, and give them the opportunity to participate in the formal economy and increase their family's income.

Job opportunities will also appear in the health sector if adaptation strategies are properly implemented by governments. As health needs rise because of the increased risk of diseases, new employment opportunities in the health and associated sectors (such as construction) will appear. Training and improved protection of workers from new risks have to be taken into account.

New jobs will also appear in the building sector, as a consequence of infrastructure investments, such as building of coastal defences, flood protection, drainage containment, road adaptation, etc. Buildings, infrastructure and homes will have to be better adapted to climate change, and political decisions that promote these strategies lead to new job opportunities.



The negative impacts of climate change being automatic, proactive policies could increase the potential positive impacts of climate change adaptation policies.

Box 2.4. Examples of adaptation measures and initial identification of their positive and negative impacts

Sector	Negative effects of climate change	Examples of adaptation measures	Employment effects of some adaptation measures
Agriculture, forestry and ecosystems	<ul style="list-style-type: none"> • Reduced yields in warmer regions due to heat stress • Damage to crops • Soil erosion, inability to cultivate land due to water logging of soils • Land degradation • Increased livestock deaths • Damage to coral reefs • Salinisation of irrigation water, estuaries and freshwater systems 	<ul style="list-style-type: none"> • Increase productivity of paddy farming for new climate conditions • Expand non-farming economic activities • Farm crops that are able to face a wider variability in weather conditions. A broad-range of tolerance will be more important than optimal tolerance to one stress factor. • Use drought tolerant, low growing leguminous species which are useful for fodder and fuel wood. • Investigate the use of new forestry species • Promote indigenous/local technologies • Establish local tree nurseries contour planting • Fencing against livestock • Economic diversification 	<p style="text-align: center;">+ + +</p> <p>⇒ However, it takes 2-3 years before any income/livelihood benefits arise from new trees (fruit/fodder/fuel wood). In addition, the labour required for new crops or species may in fact be less. In these cases, workers need to be rewarded with outside funding in order for schemes to be viable.</p> <p>⇒ Attention should be given to impacts on employment in pastoralist communities.</p> <p>⇒ The gradual shift of economic activity from a climate-sensitive agricultural and shrimp/fish culture, to the climate-insensitive industry and service sectors is a viable option to minimize risks, conserve natural resources and shift towards sustainable development. Training and other accompanying measures should be designed to minimize suffering to workers and their families.</p>

Sector	Negative effects of climate change	Examples of adaptation measures	Employment effects of some adaptation measures
Human health	<ul style="list-style-type: none"> Increased risk of heat-related mortality, especially for the elderly, chronically sick, very young and socially-isolated Increased risk of deaths, injuries, infectious, respiratory and skin diseases Increased risk of food and water shortage Increased risk of malnutrition Increased risk of water- and food-borne diseases Increased risk of deaths, injuries, post-traumatic stress disorders Increased risk of migration related health effects 	<ul style="list-style-type: none"> Increase capacity for management of climate related risks Adapt healthcare and social care infrastructure (hospitals, nursing homes) to be more resilient to the effects of heat, gales and floods Measures against health impacts (any measure that could counter increasing risks of death, injuries and illnesses) 	<p style="text-align: center;">+ +</p> <p>⇒ Improvements in health systems can create new and greater employment opportunities. However, for this to be true, certain conditions must be fulfilled: increased training, improved protection of health workers from OHS* risks.</p> <p style="text-align: center;">* Occupational Health and Safety</p> <p style="text-align: center;">+</p> <p>⇒ Any measure aimed at improving health conditions of workers will tackle the negative effects of climate change on available labour force and the productivity of workers, thus having a positive impact on employment.</p>
Human settlements and society	<ul style="list-style-type: none"> Reduction in the quality of life for people in warm areas without appropriate housing Disruption of settlements, commerce, transport and societies due to flooding and water shortages Pressures on urban and rural infrastructures Impacts on the tourism sector (winter tourism, Caribbean tourism) 	<ul style="list-style-type: none"> Investments in infrastructure, such as coastal defences, flood protection, drainage containment, roads adaptation Make buildings, infrastructure and homes more adaptable to climate change Technology and behavioural changes; modifications in seasonal tourism; Economic diversification 	<p style="text-align: center;">+ - +</p> <p>⇒ In areas such as infrastructure, water management, labour-based processes in public works programmes could create large numbers of jobs.</p> <p>⇒ Depending on regions, technology and behavioural changes could slow the deteriorating impact of climate change. However, tourism can only be salvaged in the long run by ambitious climate change policies.</p>

Source: IPCC, 2007 and regarding employment, Sustainlabour, 2008

ANTICIPATE IN ORDER TO SUCCESSFULLY ADAPT: RESEARCH, DIALOGUE AND DEMOCRATIC DECISION-MAKING

The IPCC dedicated a third of its Fourth Assessment Report to understanding the impacts of climate change on natural and human systems, the capacity of these systems to adapt and their vulnerability. Unfortunately, no section of this report focused on employment. What is the reason for this absence?

The main reason is that no country-based studies have been undertaken, and no regional or global estimates have been made to understand the impacts of climate change on employment. Thus, there are no suggestions in the report on the kind of measures that need to be taken to reduce these impacts. There is currently no assessment on the positive effects for employment of adaptation policies, making it hard for workers to evaluate the impacts and assess the support they should give to these initiatives in the future.



We need dialogue!

By now, most countries have engaged in the construction of National Adaptation Plans of Action. In the course of their design, these plans take into account stakeholders such as employers, who can express their key concerns with regard to their business and their capacity to adapt to new environmental conditions. However, in general there have few, if any, consultation with trade unions and workers to integrate their knowledge, concerns and suggestions regarding climate change and adaptation plans into these National Adaptation Plans of Action.

One reason for this is probably the lack of awareness among workers and their organizations that these processes are taking place. If it is the case, it raises the need for strengthening the capacity of the trade unions in these essential issues. Training and education should be provided to ensure that all the knowledge that workers and trade unions bring to the table is taken into account, especially since the resulting adaptation plans will condition our quality of life for at least the next 30 years.

Climate change, as emphasized throughout this Manual, is a collective problem. As such, it has to be solved by all. Society cannot be expected to take responsibility for the implementation of strategies if they were not given the opportunity to participate in the decision making process along with other actors. It will be particularly difficult for workers to support strategies that could carry with them the loss of jobs, if they feel they have not been consulted and listened to.

In this initial stage of adaptation, spaces must be created for consensus building, in particular in developing countries. These can be positive for employment by bringing together different social partners. Social dialogue on adaptation can also build confidence for future discussions about mitigation, especially in sectors where dealing with impacts requires common understanding and negotiation.

UNIT 3: EFFECTS OF MITIGATION ON EMPLOYMENT

KEY IDEAS

- Mitigation strategies are necessary to reduce future climate risks, but also to make today's adaptation strategies viable.
 - Mitigation could create jobs in sectors such as energy efficiency, renewable energy, building restoration and regeneration, or public transportation. However, the social and environmental qualities of these jobs remain unclear. We therefore have to work on the promotion of decent and green jobs from the very start.
 - Mitigation will also give rise to stress in certain sectors, such as those related to fossil fuels or energy-intensive industries and services. Measures aimed re-training, social protection and local economic diversification in affected sectors and zones are essential to protect workers from these changes.
-

Current efforts focused on avoiding the impacts of climate change will encounter serious difficulties in the future if governments do not undertake more ambitious measures to reduce the amount of greenhouse gas emissions in the atmosphere. This is the case because if GHG in the atmosphere rise above 450-550 ppm, irreversible damages to ecosystems and human lives will occur.

For this reason workers and trade unions should be concerned that the policies currently in place are not enough to curb the current trend. Mitigation policies need to be more ambitious and obtain wider support. Some sectors of our economy are already or will soon be targeted by these measures (i.e. energy production, energy-intensive industries, transport, etc.). Workers and trade unions need a better understanding of the impacts these measures will have on employment, not with a view to blocking them but to ensure that the most vulnerable will be prepared to face the necessary changes and not pushed even further into exclusion. A fair transition has to be designed and for this to be possible, mitigation measures must be accompanied by social protection measures whenever job or income losses are expected.

On a more positive note, this unit will demonstrate that mitigation measures can indeed have positive impacts on employment, by opening new activities in sectors affected by the targeted GHG emission reductions. In the building sector, for example, targets for emission reduction mean renewing current buildings to render them climate-friendly, which will result in a rise of employment in the sector.

Mitigation is key if we want our society to survive climate change, and workers and their organizations will have to face the challenges this transition will bring. Workers and trade unions' capacity to deal with change depends among other things, on our ability to determine

the means to help those affected by the measures. On the other side, mitigation will offer opportunities which still remain unclear, but are likely to result in an important number of jobs being created. Maximizing opportunities whilst minimizing negative effects must be the common goal in this area.

MEASURES TO ADVANCE MITIGATION AND CREATE GREEN DECENT JOBS

The table in box 2.5. shows a sample of initiatives aimed at reducing GHG emissions, and which can have a positive impact on employment in different sectors.

In the **energy** sector, measures promoting energy efficiency, such as regulations, will be able to create jobs in auditing and other energy services. Auditing and evaluation of energy consumption, the analysis of reduction opportunities for industrial and commercial facilities, as well as households, are initial activities from which important sources of employment could emerge in the future.

In their study "Climate Change and Employment", the European Trade Union Confederation (ETUC), along with other research partners, assess the need for evaluating further the positive effects of energy services: "(...) our evaluations underestimate the jobs that could be sustainably created in the electricity sector through the provision of energy services to meet consumers' growing energy efficiency requirements"¹⁵.

The expansion of labour-intensive renewable energies such as solar, wind, geothermal and agroenergy will have a positive impact on employment. However, this rise in employment opportunities can only be taken up by workers if they are trained in advance to respond to the demand. Shortages in the labour force for this key area have already been identified and would probably disappear if ambitious training and education programmes were put into place. If these deficiencies are taken care of, then the job potential in the renewable sector could be huge. In Germany, for example, a recent study¹⁶ found 400,000 to 500,000 people may be employed in renewables by the year 2020, and 710,000 by 2030. The sector's current workforce accounts for 170,000 people.

In the case of the European Union, which has set itself ambitious targets for renewable energy development, a modelling exercise concluded that under current policies, there would be about 950,000 direct and indirect full-time job creations by 2010 and 1.4 million by 2020. Under an Advanced Renewable Strategy, there could be 1.7 million net job creations by 2010 and 2.5 million by 2020.¹⁷

15 ETUC (2007). "Climate Change and Employment." <http://www.etuc.org/a/3673>

16 "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World" (September 2008), commissioned and funded by the United Nations Environment Programme (UNEP), as part of the Green Jobs initiative jointly mounted by UNEP, the International Labour Organization (ILO), the International Organization of Employers (IOE), and the International Trade Union Confederation (ITUC), produced by the Worldwatch Institute, with technical assistance from the Cornell University Global Labour Institute.

17 European Commission, "Meeting the targets and putting renewables to work, Overview report", mentioned in "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World" (September 2008), commissioned and funded by the United Nations Environment Programme (UNEP), as part of the Green Jobs initiative jointly mounted by UNEP, the International Labour Organization (ILO), the International Organization of Employers (IOE), and the International Trade Union Confederation (ITUC), produced by the Worldwatch Institute, with technical assistance from the Cornell University Global Labour Institute

In the case of agroenergies, it is clear that the number of jobs created is already very high. A study for Brazil identifies several reasons that makes ethanol production a huge opportunity for job creation.¹⁸ We should, however, give greater importance to analysing working conditions and overall environmental impacts ahead of their promotion. As agricultural products, agrofuels will probably contribute further to already problematic working conditions (i.e. serious labour rights violations, occupational health and safety problems).

A report¹⁹ puts together a certain number of estimates on employment in the renewable energies sector (see table below):

Box 2.5. Employment Estimates in the Renewable Energy Sector, Global and Selected Countries, 2006

Renewable Energy Source	World / Selected Countries ¹	Employment (number of jobs)
Wind	World	300,000
Solar PV	World	115,000
Solar Thermal	China, Germany, Italy, USA	624,000 +
Biomass	Brazil, USA, China, Germany	1,174,000
Hydropower	Europe, USA	39,000
Geothermal	USA, Germany	25,000
Renewables, Combined		2,277,000

¹ Countries for which information is available

Source: "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World" (September 2008), commissioned and funded by the United Nations Environment Programme (UNEP), as part of the Green Jobs initiative jointly mounted by UNEP, the International Labour Organization (ILO), the International Organization of Employers (IOE), and the International Trade Union Confederation (ITUC), produced by the Worldwatch Institute, with technical assistance from the Cornell University Global Labour Institute.

"The table suggests that current global renewables employment runs to about 2.3 million. It should be noted that this is an incomplete figure as global figures are not available for all renewables. A notable gap, for instance, concerns employment in the small hydropower in China (...).

18 IAEA (2006). "Brazil: A country profile on Sustainable Energy Development."

19 "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World". Report commissioned and funded by the United Nations Environment Programme (UNEP), as part of the Green Jobs initiative jointly mounted by UNEP, the International Labour Organization (ILO), the International Organization of Employers (IOE), and the International Trade Union Confederation (ITUC), produced by the Worldwatch Institute, with technical assistance from the Cornell University Global Labour Institute, (September 2008).

Given strong and rapidly rising interest in these energy alternatives, future years may well see employment soar - possibly as high as 2.1 million in wind energy and 6.3 million in solar PVs by 2030, and on the order of 12 million jobs in biofuels-related agriculture and industry. Installations and maintenance of solar PV systems in particular offer tremendous job growth. With regard to the impact of biofuels development on the agriculture sector, however, there are many questions that remain to be addressed and that will determine not only the quantity of jobs, but also their quality and broad impacts on rural livelihoods and economies. The renewables sector is a possible and likely source of large-scale green employment, but a conducive policy environment is essential for translating this potential into full-fledged reality".

In the **building** sector, promotion of climate friendly buildings and implementation of regulation aimed at building renewal are expected to create an important number of jobs. This sector (particularly labour-intensive) will nevertheless face the challenge of improving job quality, which remains very weak. Efforts will have to focus on providing workers with the training and new qualifications needed to improve their working conditions.

The European Trade Union Confederation report creates two time periods under which a 75 percent reduction in GHG emissions could take place. In the 2050 scenario, 1,377,000 Full Time Equivalent (FTE) jobs would be created; in the 2030 scenario 2,585,000 FTE jobs would be created. This ambitious EU scenario requires that government play a key role in funding energy efficiency programs which will in turn help fund new employment and stimulate economic growth. The other less ambitious scenarios would result in less job creation. The Business as Usual (BAU) and Eurima ²⁰ scenarios, which reduce emissions by 8 and 16 percent respectively, would create 20,000 to 62,500 FTE jobs for BAU and between 160,000 and 500,000 for the Eurima scenario.²¹ Comparing these scenarios demonstrates that the larger the investment and the faster that these programs can be implemented, the larger the number of jobs that can be created.

Further research is particularly needed that looks at the evolution of the building sector in developing countries, where efforts to reduce emissions have not yet been placed on the political agenda. If positive impacts on employment of retrofitting building policies were better known, it could be envisaged to promote these policies in developing countries as part of an employment or job creation agenda. This would have another positive outcome: a reduction in greenhouse gas emissions.

In the **transport** sector, public transport jobs should increase, along with investment in the sector. Rail transportation, for both freight and passengers should also be an important source of well-trained and safe jobs. These are perfect examples of decent and green jobs.

An ECOTEC study, conducted for Friends of the Earth Great Britain in 1997, though dated now, still offers useful insights. It assessed the impact of promoting far greater use of railways

²⁰ European Mineral Wool Manufacturers Association

²¹ ETUC (2007). "Climate Change and Employment" <http://www.eluc.org/a/3673>

and buses (70–80 percent higher in 2010 than in 1990), as well as bicycling and walking, while reducing reliance on car use. The study assumed that the total number of passenger kilometres travelled would decline by 11 percent from 1990 levels. It concluded that at least 130,000 new direct jobs could be created by 2010, more than offsetting the loss of an estimated 43,000 jobs in automobile maintenance and repair. In addition, measures to encourage the use of less polluting, more efficient automobiles (natural gas, electric, and hybrid vehicles) and to promote leasing rather than car ownership, were found to possibly create another 35,000 jobs (because of greater attention to upkeep, leased cars lead to more maintenance jobs).²²

CLIMATE CHANGE MITIGATION IS NOT ALL GOOD NEWS: SOME MEASURES TO MINIMIZE POSSIBLE ADVERSE EFFECTS

The above table (see box 2.5.), as well as other studies on the issue, show that some sectors will suffer from efforts aimed at mitigating climate change. Furthermore, political decisions often lie behind choosing who is going to suffer most. While trade unions need to accept that changes in some sectors are necessary, they need to propose measures that prevent workers from bearing the burden of these transitions. Trade unions' long experience with regards to economic diversification in their respective countries can help find innovative options at the national level.

Sectors linked to fossil fuel energy and other energy-intensive sectors will be profoundly modified by emissions reduction policies. The latter include industries such as steel, iron, aluminium but also energy-intensive services, such as road transport.

As an example, drawing from a study by the European Trade Union Confederation, we can expect losses in the European coal sector and the oil refining industry, and because of the closure of coal plants, important effects on employment are expected in coal mining. The evolution of fossil energy in developing countries is slightly different and depends on available energy sources. Nevertheless, the long term trends –under condition of ambitious climate protection policies– appear to be similar.

Transition policies should focus on these energy-intensive sectors first and aid the re-skilling of the workforce through training and education schemes. In our example, while there is some scope for workers of coal plants to be retrained in order to respond to vacancies in co-generation or gas plants, other aspects also need to be taken into account, such as the fact that new job opportunities will not necessarily appear in the same geographical area where jobs will be lost. Special attention should also be given to the economic diversification of areas where plants are expected to close, so that the economic basis of the community does not depend on the survival of one workplace.

²² Friends of the Earth Trust. Jenkins, Tim (May 1997). "Less Traffic, More Jobs" in "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World" (September 2008), commissioned and funded by the United Nations Environment Programme (UNEP), as part of the Green Jobs initiative jointly mounted by UNEP, the International Labour Organization (ILO), the International Organization of Employers (IOE), and the International Trade Union Confederation (ITUC), produced by the Worldwatch Institute, with technical assistance from the Cornell University Global Labour Institute.

If governments do not agree at the international level on an amount of CO₂ per tonne of product, no matter what the country, energy-intensive industries may also end up suffering from emission reduction policies. As their current CO₂ restrictions are very low, agreeing on this could reduce the risk for developing countries in housing polluting industries.

The consequences on employment of CO₂ reductions in energy-intensive industries seem clear: these industries have tended to make labour pay the cost for their lack of investment in research and development. In their race to reduce production costs, industries have closed factories and looked for cheaper workforce elsewhere without necessarily investing in a sustainable policy capable of modifying CO₂ patterns in their sector of activity.

In particular, in the transport sector we should see a fall in the predominance of road transport, leading to a number of jobs being lost. Workers in this sector already suffer from bad working conditions (i.e. long working hours, weak wages). However, hope can be found in experiences that demonstrate that workers can be retrained to work in expanding areas of the sector, such as urban and/or long distance rail or urban buses.

Box 2.6. Some effects of mitigation measures on employment

Sector affected by mitigation measures	Employment-related mitigation measures	Impacts on employment	Comments
Energy	<ul style="list-style-type: none"> Switch in fossil fuels from coal to gas. Expand renewable heat and power capacities, such as hydropower, solar, wind, geothermal and agro-energy. Expand energy audits of industrial and commercial facilities. 	<p>- +</p> <p>+ +</p> <p>+ +</p>	<ul style="list-style-type: none"> We should expect losses in the coal sector and some new employment opportunities in the gas sector. The closure of coal centrals will probably also have effects on employment in the coal mining sector. While employment is expected to grow in the renewable energy sector, losses in the fossil fuels/electricity sector are to be expected. Substitutability of jobs is still unclear.
Building	<ul style="list-style-type: none"> Promote and invest in efficient lighting and day light Promote the use of more efficient electrical appliances, and heating and cooling devices. Improve insulation. 	<p>+ +</p> <p>+ +</p> <p>+ +</p>	<ul style="list-style-type: none"> Buildings renovation is a labour-intensive source of direct employment. However, the quality of the jobs is weak and the building sector will thus have to make an effort on workers' training and qualification.
Transport	<ul style="list-style-type: none"> Encourage shifts from road transport to rail and from private to public transport systems. Further develop agrofuels, above all second generation ones. Reduce individual transport use. 	<p>- +</p> <p>+ +</p> <p>- +</p>	<ul style="list-style-type: none"> Rail should be benefited by the shift in modes of transport, mainly in freight and passengers. Workers in the road transport sector (which should see its importance reduced) could be retrained to work in rail or other public transport options. While agro-fuels are labour intensive options, labour conditions, as well as overall environmental impacts need to be looked at more carefully. Labour-sound development of second generation agrofuels could bring jobs to poor agricultural communities. The consequences of this measure will have different impacts depending on how early industry shifts towards cleaner vehicles, being positive on a "first mover wins" dynamic.
Industry	<ul style="list-style-type: none"> Implement energy efficiency measures. Promote material recycling and substitution. Control non-CO2 gas emissions. Develop process-specific technologies. 	<p>- +</p>	<ul style="list-style-type: none"> Some sectors already suffering from outsourcing could be impacted by climate protection measures. However, R&D and a global move towards cleaner production could avoid these negative impacts.

Source: IPCC, 2007 and regarding employment, Sustainlabour, 2008

MODULE 2 REFERENCES

- IPCC (2007). "Fourth Assessment Report (AR4)" <http://www.ipcc.ch/>
- ETUC (2005). "Avenues for trade union action" <http://www.etuc.org/a/957>
- ETUC (2007). "Climate Change and Employment" <http://www.etuc.org/a/3673>
- Sustainlabour (2007). "Consecuencias del cambio climático" <http://www.sustainlabour.org/dmdocuments/ESP76-2006.pdf>
- ILO (August 2007). "Green jobs: Climate change in the world of work". World of Work. No. 60 http://www.ilo.org/wow/PrintEditions/lang-en/docName-WCMS_083901/index.htm

NOTES:

NOTES:
