issa

MEGATRENDS AND SOCIAL SECURITY

Climate change and natural resource scarcity

MEGATRENDS SERIES

International Social Security Association
4 route des Morillons
Case postale 1
CH – 1211 Geneva 22
T: +41 22 799 66 17
F: +41 22 799 85 09
E: issacomm@ilo.org
www.issa.int

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Climate change and natural resource scarcity

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Preface

Unprecedented economic growth and meeting increasing demand for goods and services in the world economy since 1850 has been made possible by relatively cheap access to renewable resources, such as forests, but has been particularly reliant on finite non-renewable resources such as oil and minerals. In the decades to come, the increasing scarcity of such non-renewable resources will lead to supply constraints and price increases which in turn are likely to have significant impacts on society.

At the same time, the impacts of climate change will become increasingly felt with a steady rise in the number and magnitude of extreme weather events and environmental degradation with subsequent negative effects on growth. The total cumulative global cost of climate change has been estimated at between USD 2 trillion and USD 4 trillion by 2030 across different scenarios.[1] But the warming of the planet, some 0.7°Celsius since the 1950s, is already affecting countries' development. Thirteen of the fourteen hottest years on record have been in this century[2] and the number of extreme events continues to increase with consequent impacts on agriculture output and general economic interruption.

Taken together, resource constraints and climate change represent a significant change in the environment in which social security is, and will be, operating. In 2014, The World Economic Forum listed its Ten Global Risks of Highest Concern, four of which are climate-change or natural-resource related.[3] The era of strong global economic growth fuelled by accessible and cheap resources for many countries is nearing an end; financial resources available to social security will continue to decrease over time although there will of course be regional variations. At the same time, demands on social security are likely to increase due to a potential fall in population wealth, the impacts of extreme climatic events, changes in morbidity and other effects of climate change such as increasing migration and displacement rates. A fundamental re-think of the role of social security systems in this context may therefore be required if they are to continue to meets their objectives.

This report consists of two parts. The first part was prepared under the authorship of the Global Sustainability Institute (GSI) and reflects the latest research and views of the Institute. It considers the issues of climate change and natural resources scarcity as well as their potential impacts on society and social security systems. The second part prepared by the ISSA sets out measures that social security systems need to consider and adopt to address the impacts and put in place measures to mitigate and influence the negative effects. A number of examples of practical and effective measures that social security institutions have taken are highlighted.

This report is the second in an ISSA series which seeks to assist ISSA member organizations in anticipating and reacting to megatrends. The lead author was Simon Brimblecombe, with Chapter 1 authored by Aled Jones, and Chapter 2 by Simon Brimblecombe and Ian Orton. Comments and inputs were provided by Shea McClanahan, Roddy McKinnon, Gwenaël Dhaene and Dmitri Karasyov.

1. See <www.ifc.org/sustainableinvesting>.
2. See <www.wmo.int>.
3. See <www.weforum.org/reports/global-risks-2014-report>.

Executive summary

This report considers the impacts of climate change and natural resources scarcity on social security systems – both direct and indirect – and highlights policy and administrative responses to them. There will be many significant impacts with uncertainty regarding their magnitude and nature. Many of the impacts will be interrelated, complex and difficult to anticipate and are likely to include:

- An increase in the number of extreme climatic events leading to economic and social disruption and displacement of populations.
- Environmental degradation with stress on key natural resources leading to price increases and social conflict.
- A reduction in economic growth as a consequence of population growth, and limited natural resources.
- A reduction in the share of GDP made up by labour, reflected in a fall in real wages and increasing inequality in employment status.
- Changes in mortality and morbidity with degradation in the health status in many regions.

These impacts will have a direct effect on the demands placed on social security systems and the resources available to them. These impacts include the following:

- The need to respond to extreme climatic events (e.g. flooding, coastal erosion and landslides).
- The impact of increased migration and displacement as well as precarity of labour markets.
- Increasing likelihood of social conflict.
- Reduction in economic growth impacting on resources available to social security and supplementary provision for individuals (e.g. employer focused provision).
- Direct impact on the value and income generated from social security reserve fund assets.
- Reduction in life expectancy for certain groups as well as increased rates of morbidity and the emergence of new health challenges in a number of regions.

The concrete impacts on social security and the possible responses include:

- There will be an increase in demand for benefits and changes in the nature of population needs: for example, sudden onset extreme events will require immediate emergency measures, flexible benefits and contribution terms, targeted intervention to those in most need and supporting administrative measures such as temporary offices, while environmental degradation, sea level rises, repetitive floods and increasing droughts (often known as "slow onset events") will require innovative but cost efficient unemployment schemes and appropriate health responses.
- Specific responses to increased migration and displacement including a redesign of benefits, the signing and application of bilateral and multilateral agreements and improved communication and access measures.

- Constraints on resources available to social security will require a reassessment of financing approaches and the nature of benefits provided which are appropriate in the prevailing economic environment.
- A reassessment of investment strategy in respect of reserve fund assets to move to carbon neutral investment (reducing the risks related to fossil fuel investment) and assets less exposed to the scarcity of natural resources.
- Proactive measures will be required to reduce risk and the impacts of climate change and natural resources scarcity; these include healthy eating initiatives, facilitating migration and planned relocation and involvement with other stakeholders in the labour market transformation to "green jobs" (e.g. partial unemployment systems).

These policy measures address the likely impacts of climate change and natural resources scarcity, facilitate adaptation responses (e.g. migration) and can also seek to mitigate the trends (e.g. carbon neutral investment).

Existing benefits will need to adapt and new benefits and services introduced in order to reflect the change in needs and the financing constraints. But it is important that new policies are carried out effectively and efficiently in such an environment. Institutions can assist this process by:

- *Addressing policy fragmentation:* Ensuring policy coherence and joined-up government across institutions responsible for the delivery of social protection in this new era of environmental uncertainty.
- *Good governance:* Improving governance of fund management in relation to investment of funds in climate-friendly/carbon neutral assets, appropriate technology and other activities.
- *Progressively extending coverage to at risk groups:* Increase efforts to cover at risk groups (agricultural/fishing/seasonal workers, migrants, and people living on or near coastlines) and taking into account the contributory capacities of different population groups, reprioritizing expenditure, and the effective enforcement of contribution obligations are ways to facilitate greater affiliation.
- *Sharing experiences and expertise:* National administrations with successful and relevant climate adaptation experience can share this to help other administrations in the construction of climate sensitized systems.
- *Integrate disaster and climate-sensitive monitoring and evaluation:* Regular monitoring and the collection of accurate statistics are essential for evaluating performance of programmes in relation to these new channels and for identifying good practices and weaknesses and challenges.
- *Building institutional capacity:* Existing agencies with a proven track record of trustworthiness and reliability in administering schemes can take on new responsibilities for climate-adapted social security responses and play a supportive role to newly created administrations.
- *Embracing new technologies:* New technologies can assist in the initial and long-term social security response in risk analysis, management and planning and for processing and managing membership and claims and in delivering benefits.

While the challenges ahead are significant, a number of policy and administrative measures have already been taken to address certain aspects of climate change and natural resources scarcity. Climate adapted social security is a reality in a number of countries as highlighted in this report. These experiences can act as a model for future intervention and be adapted as the external environment changes. Approaches need to be coordinated with other stakeholders to ensure consistency in responses and an effective use of resources. Social security institutions can be expected to continue to play an essential role in society's response to one of the key challenges facing humanity this century.

1. Climate change and limits on natural resources

Professor Aled Jones, Global Sustainability Institute, Anglia Ruskin University, United Kingdom

This chapter explores some of the global environmental trends that will impact on economic development and the wider ability of governments to provide adequate social security in the future.

The increasing pressure of the long-term trend of climate change and the availability of essential natural resources will have significant impacts on economic development with a range of possible adverse effects on global society. In what follows, current best knowledge on these two factors and their possible future evolution is examined. Paradoxically, while their impact on society and social security may be greater than other exogenous factors such as demographic or labour market development, policy-makers, employers and other stakeholders have put in place very limited effective measures to anticipate and mitigate these impacts. Indeed some commentators argue that current measures exacerbate or accelerate the impacts.

The impacts of climate change and natural resource scarcity are often similar and interdependent. This chapter however considers each element in turn to identify their key respective effects.

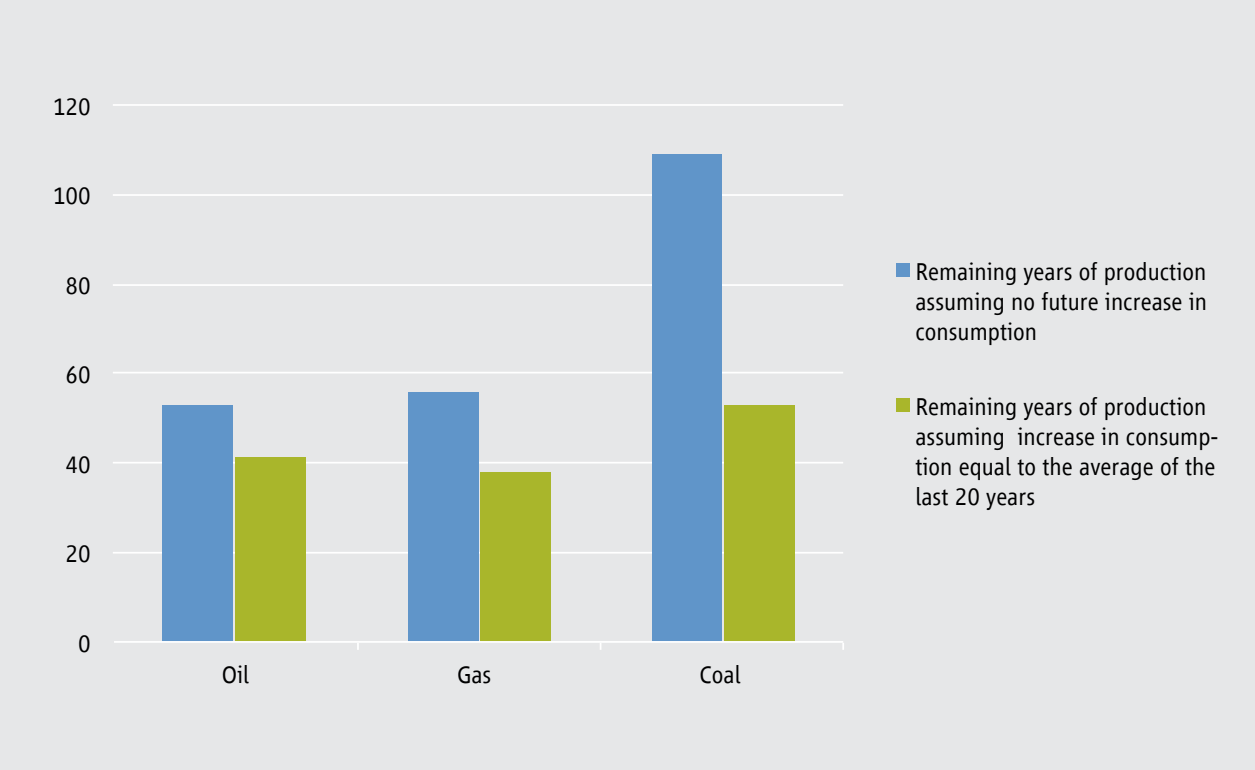
1.1. Limits on natural resources

Global economic activity and growth depends on a readily available and accessible supply of essential resources. However, most non-renewable resources, that are at present the dominant component of energy production and industrial capacity, are becoming increasingly scarce while demand is increasing due to economic development and population growth.

The question of the availability of certain resources is complex. Figure 1.1 shows the current availability of some of the critical resources at their current consumption rates. In reality the exact number of years left of economically-viable extraction for each resource will depend on a number of factors. First, as the price of the resource increases, previously uneconomic sources become viable due to increased investment into extraction technologies or difficult-to-mine areas becoming financially worthwhile (such as deep ocean drilling). Second, technology change (possibly driven by increases in the prices of resources) or policy change (for example, by putting an absolute global cap on carbon emissions and therefore a limit on the use of fossil fuel) may allow resource switching which lowers demand. Third, but most important, economic growth and activity will alter consumption patterns over time. For example, assuming an increase in future consumption based on a continuation of historic trends (over the past 20 years there has been an average annual increase in consumption of approximately 1 per cent for oil, 2 per cent for gas and 2.5 per cent for coal) would result in oil running out in 41 years, gas in 38 years and coal in 53 years.

The overarching trend has been one of increasing consumption and while some efficiencies have been seen these are driven by price increases. Therefore, resource prices are likely to significantly increase over the short to medium term.

Figure 1.1. *Remaining years of production for a variety of energy commodities*



Note: Values are based on global economically viable reserves divided by current annual consumption assuming no change in demand. Data is for 2012.

Source: <www.bp.com/statisticalreview>.

1.2. Climate change

In parallel, climate change is having an increasingly significant impact on economic and financial activity around the globe with these impacts likely to increase over time. In September 2013 the fifth assessment of the scientific evidence for climate change was published (IPCC, 2013). The process for drafting the Intergovernmental Panel on Climate Change (IPCC) reports are consensus-driven by the scientific community and politically-driven by countries as part of the United Nations process and includes those governments less keen on action to tackle climate change. Nevertheless, the 2013 assessment report presented the latest evidence for climate change and for the first time looked at the likelihood of current extreme weather events being consistent with a non-warming world. The report stated that "warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia".

While the exact impact of climate change in the medium and long term of course remain uncertain at this stage (IPCC, 2014), global change will depend on which development scenario is followed (Table 1.1) – i.e. whether the global community acts, and to what degree, to lower future climate change causing emissions.

Table 1.1. *Average temperature and sea level rise by 2100*

	Scenario	Mean temperature rise (°C)	Likely range of temperature rise (°C)
Global Mean Surface Temperature Change (°C)	1. Strong mitigation action taken (RCP 2.6)	1.0	0.3 to 1.7
	2. Business as Usual (RCP 8.5)	3.7	2.6 to 4.8
	Scenario	**Mean sea level rise (metres)**	**Likely range of sea level rise (metres)**
Global Mean Sea Level Rise (m)	1. Strong mitigation action taken (RCP 2.6)	0.40	0.26 to 0.55
	2. Business as Usual (RCP 8.5)	0.63	0.45 to 0.82

Note: Average temperature and sea level rise calculated under two extreme scenarios – RCP2.6, where strong mitigation action is taken such that emissions have peaked and dropped before the end of the century, and RCP8.5, which is the business-as-usual scenario.

Source: IPCC (2013).

The international scientific research community is now developing more sophisticated models to explore local and regional effects to be able to better estimate what the physical impacts over the medium to long term will be in different parts of the world. So while some countries, particularly northern colder countries such as Canada, may see a short term benefit from warmer climates, other countries, particularly countries already experiencing extremes of weather, such as Australia, are likely to see significant ongoing negative impacts.[4] One example is the increasing costs related to the rise in sea levels caused by climate change. These include the human costs related to direct health and housing implications of populations living in affected areas, but also business interruption costs. Over the twentieth century, increasing economic activity moved to coastal areas and over 70 per cent of the world's population lives within 60 kilometres of the sea[5] and in the United States alone there was a 34.8 million increase in coastal population between 1970 and 2010.[6] This activity is particularly vulnerable to the impact of climate change. Another example is the droughts in the United States in 2012 have cost the insurance industry and Federal government over USD 14 billion in the form of crop insurance payouts and the impact of this extreme event is also a factor in the increased global price of food (Shields, 2013). However, the most affected countries are likely to be those worst off and, often, those that contributed the least to climate change.

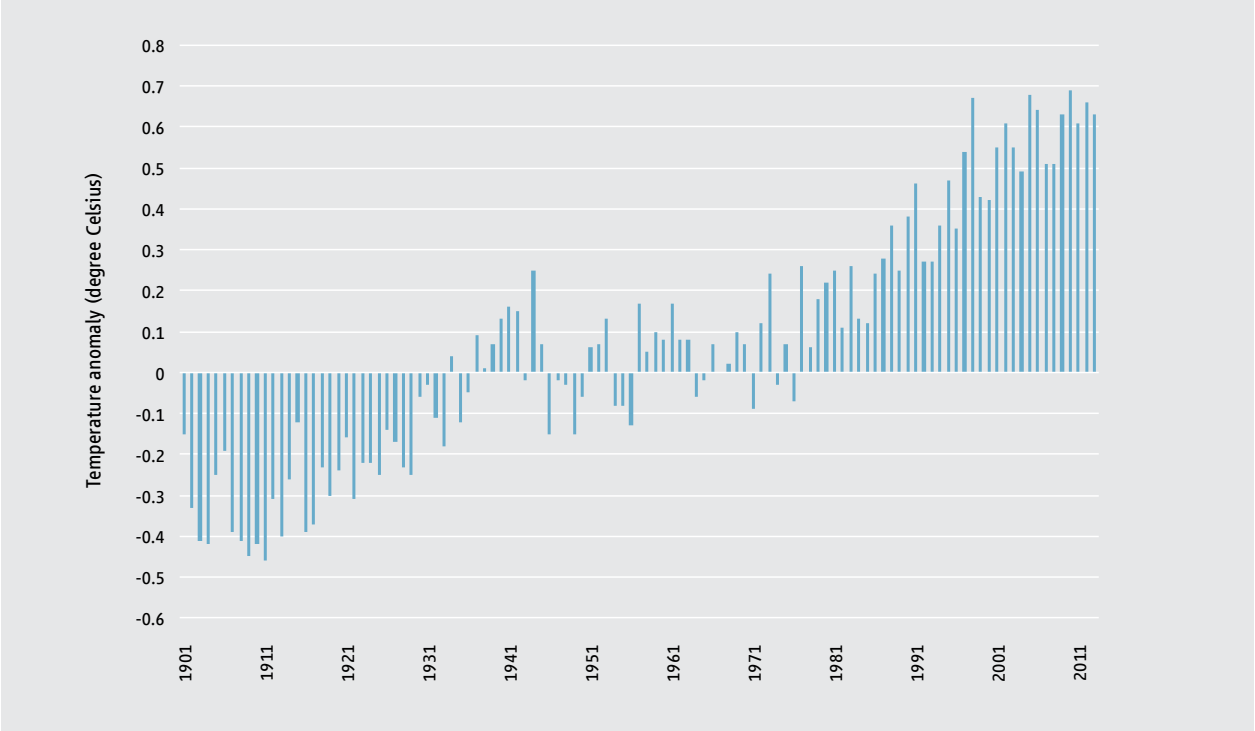
While the planet continues to warm (Figure 1.2) and increases in carbon emissions remain at the higher end of all projections, the impact from climate change is likely to be increasingly severe across the globe and will only make resource issues more difficult to address. So although global average annual temperatures will rise, the regional variations will be significant. The complex interactions of factors such as wind streams may result in more extreme winters and lower annual average temperatures in a small number of regions as witnessed over the last century.

4. The year 2013 was the hottest year ever recorded in Australia, with an average temperature of some 23.0 °Celsius. The thirteen hottest recorded years ever all occurred in the last fourteen years. See <www.climatecouncil.org.au/>.

5. See <www.unep.org/urban_environment/issues/coastal_zones.asp>.

6. See National Oceanic and Atmospheric Administration <www.ncdc.noaa.gov/cag/time-series/global>; US Department of Commerce (2013).

Figure 1.2. *Observed change in average surface temperature 1901–2013*



Note: Values are based on global economically viable reserves divided by current annual consumption assuming no change in demand. Data is for 2012.

Source: <www.climatechange2013.org/report/reports-graphic/report-graphics>.

1.3. Trends, challenges and scenarios

To enable economic growth over the past century the world economy has relied on relatively cheap access to both renewable resources, such as forests, and non-renewable – and thus finite – resources such as oil and minerals. Infinite growth in a finite world is not possible and therefore the limited nature of resources will at some point start to place limits on economic growth.

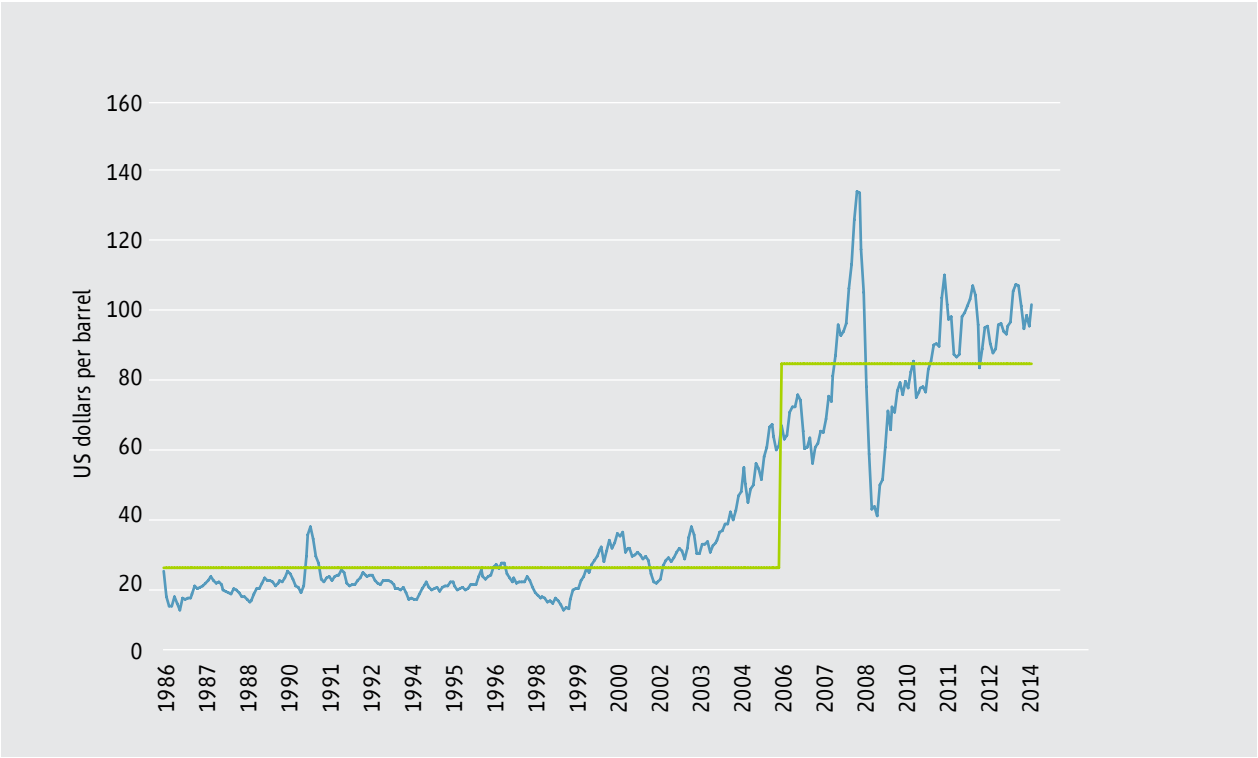
In 1972, the Club of Rome published the Limits to Growth (Meadows and Club of Rome, 1972). This used system dynamics theory to analyse the long-term causes and consequences of growth in the world's population and its economy. The model measured the impacts of resource scarcity, food production, pollution levels, population growth and changes to economic activity (services and industrial output). It showed that without substantive policy intervention, resource availability could significantly reduce industrial output per capita. Not only will resource limits severely impact economic growth but pollution levels could reach a level that would severely impact food production. The overall message of the report was that under this "business as usual" scenario, even with optimistic projections of resource availability, the impacts on the world economy would see a peak in productivity by the middle of this century followed by mass global famine and industrial output collapsing to levels below those seen in the nineteenth century. Subsequent analysis has continued to support the general conclusions within the original report (Meadows, Randers, and Meadows, 2004; Röckstrom et al., 2009) and further work has shown economic and political consequences of such limits (Lagi, Bertrand and Bar-Yam, 2012; Lee et al., 2012).

While limits apply to a range of resources, with resources such as indium[7] particularly in short supply, energy resources have received the most focus because of their importance in driving economic growth. Over the past decade there has been a paradigm shift in underlying energy markets leading to a step change in the price and volatility of key resources. This has mainly been driven by increasing demand alongside fossil fuel supplies being extracted from non-conventional sources, such as shale or deep offshore, which have become economic due to the higher prices of oil and gas on international markets. For example, oil prices have seen an almost fourfold increase since 2005 (Figure 1.3):

- Average oil price per barrel 1985-2005 8: USD 24 ± 10 (mean / standard deviation)
- Average oil price 2006–2014: USD 83 ± 19 (mean / standard deviation)

Over a similar period, the impacts of climate change have also been even more evident with increasing financial losses being observed. For example, in the United States estimates show that 2012 was the second most costly year, after Hurricane Katrina in 2005, for insurance losses related to climate disasters with over USD 139 billion in damages (AON Benfield, 2013). These losses are driven by three factors.

Figure 1.3. *Price increase for oil showing step change in average and increased volatility*



Source: <research.stlouisfed.org/fred2>.

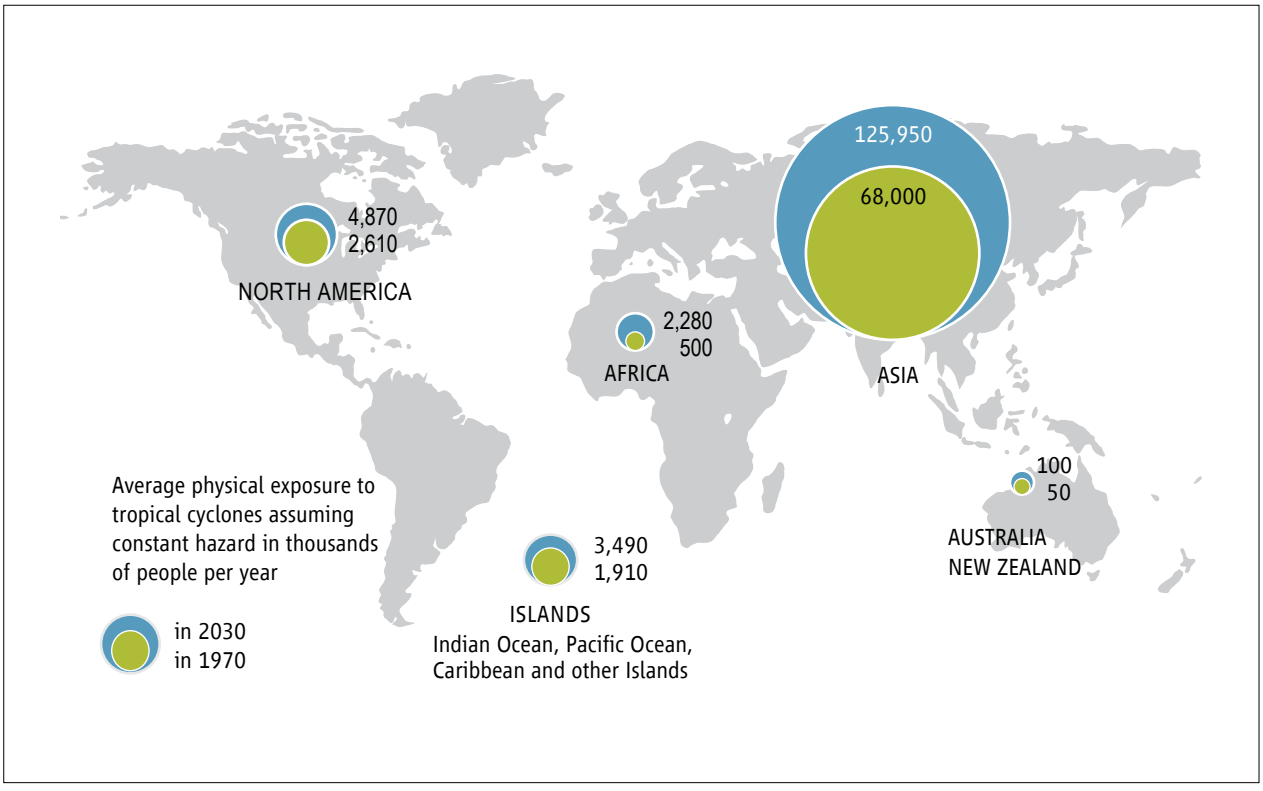
7. Indium is used widely in electronic manufacture (e.g. in semiconductors and in LED lighting), and as an alloy and in vacuum seals.

8. Derived from monthly barrel prices for West Texas Intermediate, Federal Reserve Bank of Louisiana, Dow Jones & Company; see <research.stlouisfed.org/fred2/categories/32217>.

Society has a tendency to build infrastructure in regions[9] which are particularly vulnerable to climate change, for example on coasts, and the economic value of this at risk infrastructure has increased with increasing levels of development in these areas. The magnitude and frequency of extreme weather events has increased with climate change (more extreme events including rainfall, droughts and wind) (IPCC, 2012).

Over the past three years, floods in Thailand resulted in economic losses of USD 30 billion (WEF, 2013), Hurricane Sandy in the United States resulted in losses of over USD 50 billion (US Department of Commerce, 2013) and Horn of Africa droughts in 2011 threatened the livelihoods of 9.5 million people. Typhoon Haiyan in the Philippines is estimated to have killed 10,000 individuals and created hundreds of thousands of displaced persons. The global distribution of the population exposed to cyclones by 2030 is highlighted in Figure 1.4. With an increase in both the frequency and severity of extreme events globally, we will see increasing numbers of displaced people seeking refuge elsewhere, many of who will live in precarious environments, with often limited access to the formal labour market and in countries with different cultures and languages.

Figure 1.4. *Exposure of global population to tropical cyclones 1970 and 2030*



Source: IPCC (2012).

9. Historically, there was a compelling economic necessity to develop in coastal areas and river deltas related to proximity to traditional sea-borne trading routes, temperate weather, access to food and other resources. For instance, 39 per cent of the United States population live in coastal shoreline counties, which represent just 10 per cent of the United States land area (excluding Alaska); see 2010 figures <stateofthecoast.noaa.gov/population/welcome.html>, while 44 per cent of the world's population lives within 150 kilometres from the coast <coastalchallenges.com/2010/01/31/un-atlas-60-of-us-live-in-the-coastal-areas/>.

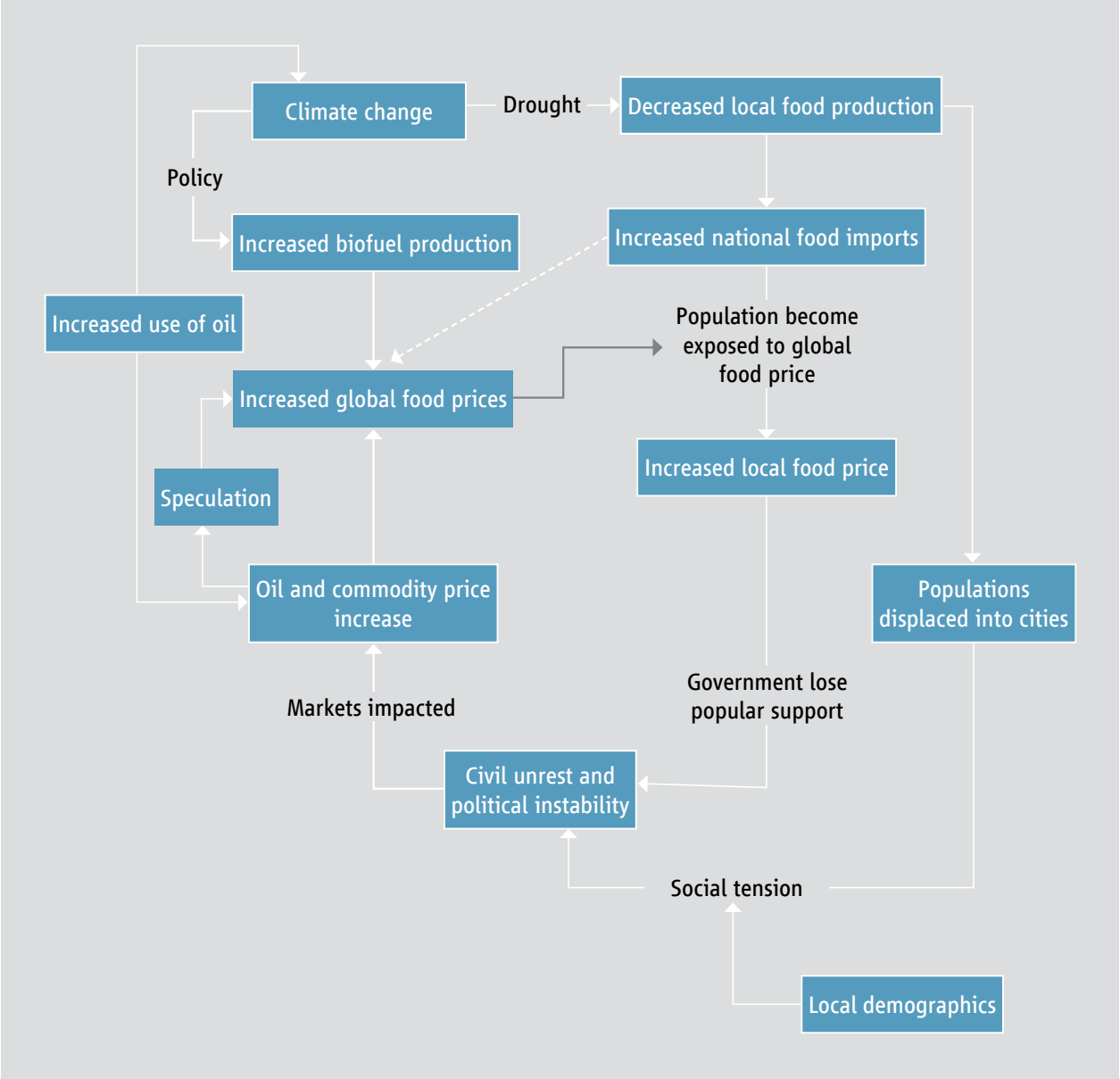
The total cumulative global cost of climate change has been estimated at between USD 2 trillion and USD 4 trillion by 2030 across different scenarios (Mercer, 2011).

Taken together, resource constraints (Figure 1.1) and climate change (Figure 1.2) represent a significant shift in global markets for goods and services. Historically easy access to cheap fossil fuel-based energy has driven economic growth. This is not going to continue over future decades. The production of food and water infrastructure depends on inexpensive fossil fuel energy; the increase in price of energy input will add additional volatility into global markets and the likelihood is an upward pressure on water and food prices globally.

How quickly prices rise and/or whether alternative technologies or processes can be put in place to alleviate some of this pressure is dependent on an early response at scale into production, supply chains, consumption and markets by governments and/or the private sector. This uncertainty on future price is likely to lead to short-term shocks and in particular increasing volatility which in turn will impact financial markets and, in turn, human welfare and income security. Jones et al. (2013) brought together the latest evidence on resource trends and climate change exploring the potential impact on the global economy and the financial sector. In particular the report focused on pensions and investment returns over a medium to long-term time horizon through the use of scenarios and actuarial modelling. This highlighted that even modest impacts from increased uncertainty and on global economic growth could have significant impacts on pension fund assets and costs.

Alongside the physical pressures from climate change and resource trends, changes in local demographics will also influence the outcomes of these global challenges. For example, ageing populations put different demands on energy and food systems and health impacts (both mental and physical health) will change. Labour markets will be indirectly affected due to the differing nature of economic development and risk. In addition, physical risks from climate change, together with the demands for increased investment into infrastructure to extract increasingly scarce resources, may limit the capital availability of governments. This in turn may limit the available fiscal space for social security budgets where these are partially or fully tax financed. The connectedness of food, water and energy systems is becoming more apparent and will be a driver for future pressures on social systems (Figure 1.5).

Figure 1.5. *Systems view of possible social impacts due to resource constraints*



Source: The author.

As regions becoming less economically productive, and see large physical shocks from climate change due to the increasing frequency and magnitude of extreme events, the likelihood of large-scale movements of people increases. Some migration and displacement may improve the demographic profile of a particular region and could alleviate pressures on social security systems (increasing the percentage of people able to work) while others could overwhelm local systems. Therefore the scale and pace of such potential population movements will be important, as will be political efforts to control such flows.

Anticipating and addressing these risks and challenges at a government level involves a transition to a new paradigm or approach, which will have economic and political benefits and risks associated with it.

1.4. Government responses

Given the impact of climate change and limits to natural resources on economic growth, the analysis of government responses can be categorized into four broad future growth trajectories. These are (Jones et al., 2013):

a. "Growth is the solution"

   Commentators argue that economic growth brings with it technological innovation that would bring about the required changes to meet resource constraint and other challenges faced by the modern world such as poverty and inequality.

b. "Green growth"

   By examining and changing indicators of growth to be more aligned with resource constraints (and climate change) global economic development would more naturally develop the required solutions to the global challenges, without harming people's "standard of living".

c. "End of growth"

   The finite size of the planet combined with the fact that the economy is now operating on a worldwide scale means that growth cannot continue and must stabilize to remain within global boundaries. Economies need to be restructured to accommodate a zero growth future.

d. "Beyond the limits"

   Resource limits and/or climate change have been ignored for too long and the global economy and population is now too large to be supported at current rates of consumption. Since long-term decline is inevitable, the best course of action is to manage this decline.

Currently the overarching paradigm followed by governments around the world is "growth is the solution". However, given the future impacts of resource constraints and the inherent delays and imperfections in the market (for example, an excessive focus on the short term) this is likely to lead to short-term shocks and price volatility at the very least. In addition, if new technologies are introduced that are more efficient in their use of resources this can occasionally increase the overall use of a particular resource over the short term as more output per unit input is possible making the activity more economically productive (this is known as the Jevons paradox[10]). Therefore, "growth is the solution" could actually hasten the time when resource limits start to have an economic impact.

Following shocks caused by resource constraints, the reaction of governments, for example in their decision over money supply and where to direct investment, will be the immediate major determinant of the impact on the economy and the financial sector.

10. Jevons paradox states that if technological progress increases the resource efficiency of a particular process then the rate of use of that resource increases rather than decreases (because the marginal benefit of using that resource increases). For example, if a vehicle becomes more fuel efficient then this may drive the rational behaviour to use the vehicle more. Therefore, technological progress does not always reduce resource consumption.

Examples of these types of responses and possible impacts are (Jones et al., 2013):

- The reaction of monetary authorities to increases in commodity prices – this will determine whether increases in commodities result in general inflation.
- Society will need to invest more and consume less (Randers, 2012) – the way this is achieved will determine investment returns both absolute and relative to wage growth.
- Financial repression – in certain circumstances governments could proactively or reactively intervene in allocating investment, to react to a perceived or actual threat. This could constrain investment returns and wage growth.
- Social upheaval – increased resource prices will cause income redistribution, possibly leading to increased social tensions and resource constraints will be unequally distributed between countries, with some countries lacking access to key resources. This could lead to international tension, with potentially reduced trade, economic activity or possible breakdown in security. How governments react will be crucial – a financial consequence could be increased inflation as governments are tempted to inflate away debt to reduce social inequality, and also increased interest rates due to increased uncertainty. Increased military spending is another possibility.[11]
- International investment – many institutions rely on returns generated internationally both directly or indirectly (via domestically listed entities operating internationally). Some regions' economies will fare better than others. However, the extent to which domestic entities can benefit relies on continued international cooperation and willingness of investee countries to attract foreign investment.

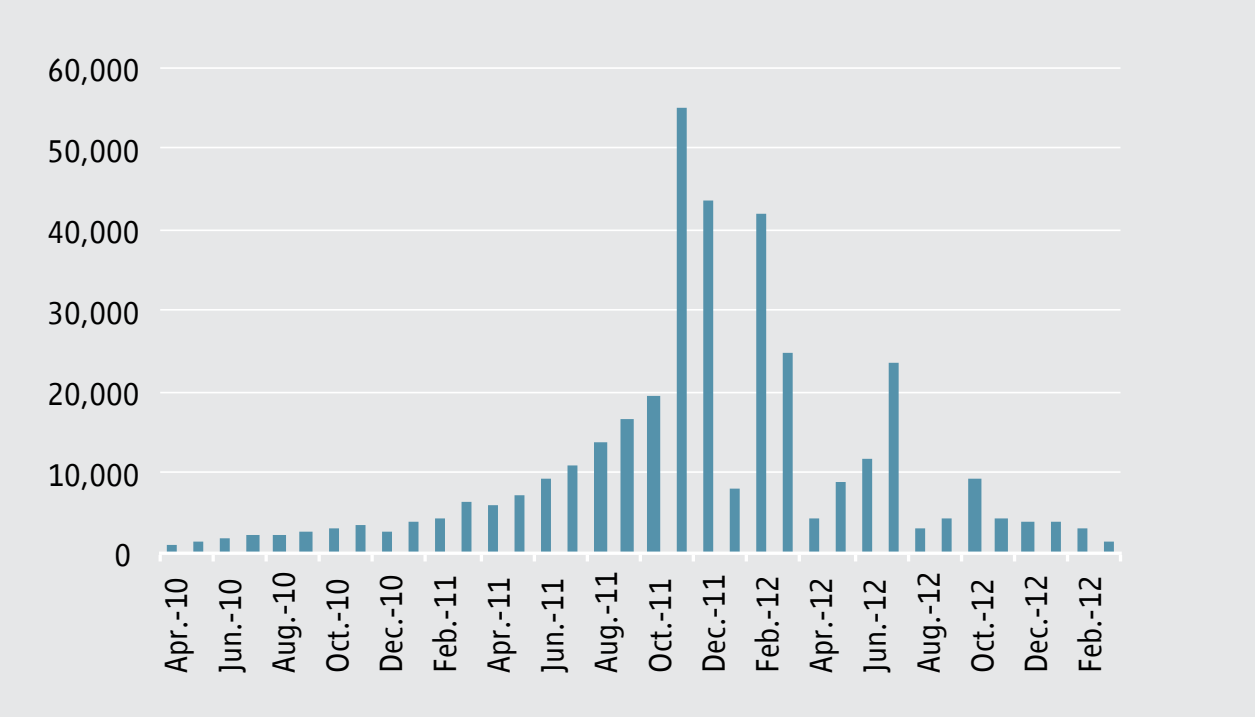
1.5. Risk in transition

Even when governments proactively set an agenda and strategy for the future (for example, emission targets) to tackle some of these issues there is a risk in transition. Some of these risks can be large, such as governments opting for one particular technology which may not in the end provide the necessary solution in time to prevent shocks. Other risks can be more local (either physically or financially) in nature but still cause uncertainty and changes in labour markets. Managing these risks can create substantial market distortions. For example, nuclear power often creates large market distortions with the state providing insurance and future price guarantees and uncertain decommissioning costs being absorbed by governments to the possible detriment of other energy sources (Hultman, Koomey and Kammen, 2007).

The United Kingdom Government introduced the Climate Change Bill in 2008 which set in place targets for reducing carbon emissions. As part of the measures introduced to help achieve those targets the United Kingdom Department for Energy and Climate Change introduced a feed-in-tariff to encourage uptake of solar photovoltaic technology. However the design of the feed-in-tariff was not sufficiently flexible, so a surge in demand meant the costs were unaffordable by government and the scheme was subsequently changed. This change has had a significant short-term impact on the solar industry in the United Kingdom (Figure 1.6) causing up to 6,000 people to lose their jobs (Business Green, 2013). This pattern of over-incentivized markets has been repeated in several European countries and while governments and markets realign to a new economic paradigm these types of financial and labour market shocks will occur during transition.

11. The IPCC's 2014 report also finds that "climate change can indirectly increase risks of violent conflicts in the form of civil war and inter-group violence by amplifying well-documented drivers of these conflicts such as poverty and economic shocks. Multiple lines of evidence relate climate variability to these forms of conflict".

Figure 1.6. *United Kingdom solar feed-in-tariff monthly commissions*



Source: Derived from <www.ofgem.gov.uk/environmental-programmes/feed-tariff-fit-scheme/tariff-tables>.

While individual examples of labour market impacts are currently relatively few, compared with the total size of national job markets, as economic transformation increases in size, these types of collapses in employment and investor confidence could have a more significant impact.

Another issue that is central to global agreements on action to tackle climate change is energy access and market development. Ensuring access to energy for those in fuel poverty to underpin health and education is an important driver for developing countries. As markets change, ensuring growth and protecting jobs is important in developed countries. Both of these issues have seen substantial subsidies from governments. Estimates put the total global fossil fuel subsidy at over USD 500 billion per annum with over USD 110 per adult per annum in top 11 rich-country emitters (Whitley, 2013). As government budgets face increasing pressure, the impacts of climate change become more evident and the price of fossil fuels continue to increase, these subsidies will become more difficult to justify in their present form.

1.6. Green economy opportunities

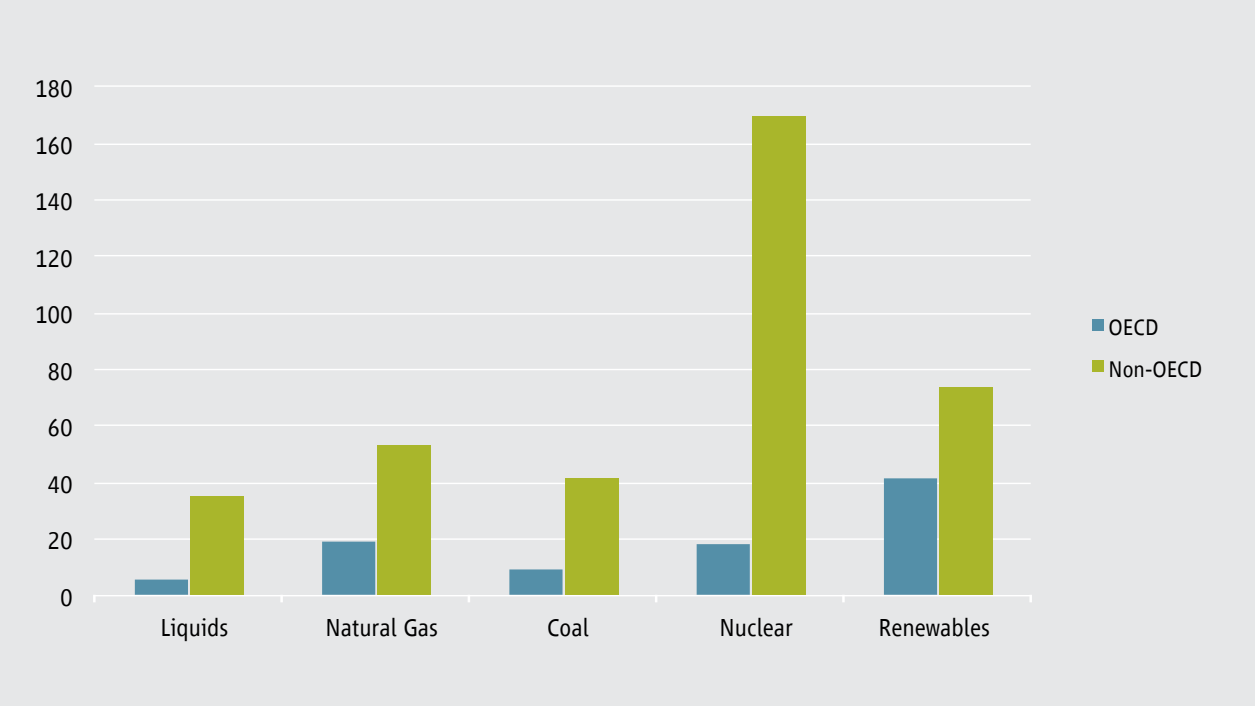
The International Energy Agency (IEA, 2010) estimate that USD 270 trillion (approximately USD 7 trillion per year) will be invested into energy supply and use under a "business as usual" scenario up to 2050. To meet the commitments already made under the United Nations Framework Convention on Climate Change (UNFCCC) an additional USD 46 trillion (17 per cent), or approximately USD 1.7 trillion per annum would be needed to be invested. In 2010 global clean energy investment reached just USD 243 billion (WEF, 2011; Pew Charitable Trusts, 2010) and therefore a fourfold increase in investment is required to meet targets.

Energy supply is only part of the investment required, with environmental products and services projected to double from USD 1,370 billion per year at present to USD 2,740 billion by 2020 (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2007, as referenced in Cedefop, 2009). This includes energy efficiency, sustainable transport, water supply, sanitation and waste management. Adaptation investment, in particular in agriculture, will add to the significant global investment over the next few decades.

Under current projections (Figure 1.7) all forms of energy generation, including fossil fuel, are projected to increase substantially over the coming years and decades. Therefore, the demand for a skilled labour market in energy generation and supply is likely to be much larger in the future.

Jobs will be created in a number of sectors and lost in others. Social security systems will need to be flexible to cope with the issues raised by transition towards a greener economy, in particular those related to the re-skilling of labour markets. Skill shortages are already reported in a number of sectors including the biofuels industry[12] in Brazil, the renewable energy and environment industry in Bangladesh, Germany, and the United States and in the construction sector in Australia, China, Europe and South Africa (BVET, 2007; London Energy Partnership, 2007, as referenced in Cedefop 2009). The focus of training and re-skilling efforts by government agencies need to reflect this transformation.

Figure 1.7. *Percentage increase in generating capacity by energy source for 2015–2035*



Note: The labour market demand from this increase in energy generation is likely to be significant.
Source: Derived from EIA (2011).

12. The biofuel industry is controversial in some areas, notably the United States and European Union, with poorly enacted legislation creating competition between biofuel and food production. The latest generations of biofuels are providing some solutions to this, for example "drop in" biofuel for jet engines is now in routine use. However there are still questions regarding land use changes and their total contribution to reducing emissions.

Solutions to resource constraints and climate change not only include large-scale infrastructure projects requiring engineering and project manager skills. In addition a substantial effort in development, lifestyles and behavioural change is required. This involves increased investment in education systems, restructuring financial systems, a shift in the narrative that highlights the opportunities enabling behaviour change, new methods to capture and reprocess waste in the retail sector, shifts in regulation and a re-purposed health system (see, for example, WBCSD, 2010).

Health strategy and delivery is increasingly the focus of debate and attention. The move from a reactive to proactive health service is seen as necessary to meet the challenges of future demographics and to meet the challenges of escalating costs of health service provision today. For established health systems, a more focused approach to enabling citizens to live healthier lifestyles through the provision of health management (WBCSD, 2010) services will need to be deployed. For countries with nascent health coverage and provision, the challenge will be to ensure affordable and adequate universal health care under the constraints of climate change and scarcity of natural resources. The co-benefits of lower health care costs, a better average "well-being" for citizens and lower resource demands from health care systems are potentially large. For parts of the world this involves a new strategic direction for large centralized health (care) systems and for other parts it involves building or expanding existing systems using both traditional and tailored approaches (e.g. microinsurance can be effective in certain circumstances) where appropriate to increase access to better health care.[13]

Green economic growth is a significant opportunity for countries, governments and private-sector players all over the world. However, the nature and speed of the transformation to new low carbon and resource efficient modalities is not without risk. As economic and physical shocks increase in scale, countries that are better prepared will be able to respond more effectively.

1.7. Risks, shocks and stagnation

This section analyses two concrete impacts of the trends referred to above: impacts on tax revenues and therefore financial resources for governments and impacts on departmental spending. To examine the possible impacts we will use both a current case study and a future scenario.

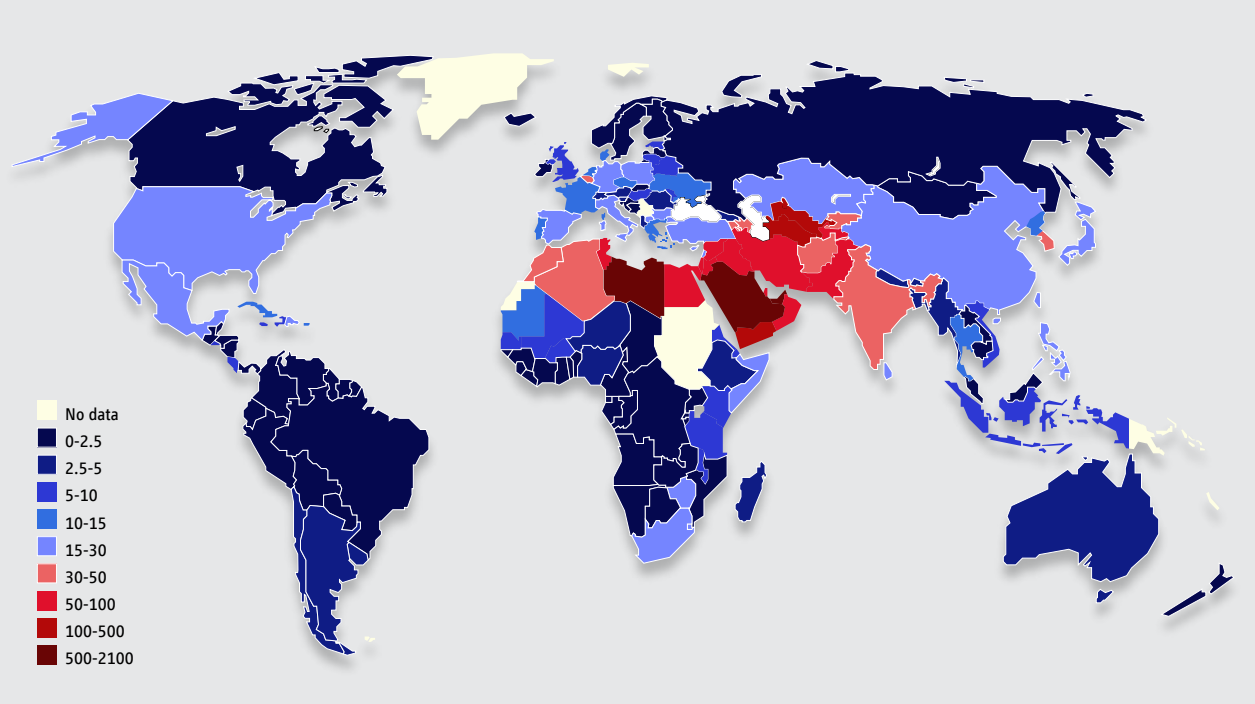
1.7.1. Case study: Water

A critical resource that will have significant local impacts on the well-being and possible economic growth of regions is water. Water supply (Figure 1.8) is already under stress; there is not enough water availability to reliably meet the demand from current activity in several regions of the world.

Access to freshwater is but one of many sources of future potential conflict – in 2050, with 9 billion people, the majority in urban environments, a substantial proportion will be facing significant resource constraint or climate change impacts, leading to a large and negative welfare impact and potential social conflict.

13. Although microinsurance can be an effective approach to increase coverage and ensure accountability, there are also a number of challenges to its introduction in developing regions (see Cichon, 2013). In addition, the provision and financing of adequate benefits remains a challenge.

Figure 1.8. *Percentage of freshwater withdrawn to meet current water demand within a country*



Note: Higher than 100 per cent means that fossil water (groundwater) is over-abstracted, water is sourced from neighbouring countries through rivers or desalination technologies to extract water from seas or oceans are used.

Source: Data derived from the Global Resource Observatory database.

To help explore the possible impacts, we have developed a future scenario based on "business as usual", where governments and business do not transform the economy early enough to avoid some of the impacts of resource constraints and climate change (Jones et al., 2013). Under this scenario, we highlight impacts on society and the economy including on social security systems.

1.7.2. In the year 2100: A look back at the century

Governments and financial markets had a low sensitivity to resource limitations. Prices for resources were set based on short-term availability (supply and demand) and government regulation focused on managing the flows of these resources rather than their stocks. A limited price on carbon was introduced in some markets, however this fluctuated widely and therefore was not a strong driver of investment. Decision making for both the finance sector and government was based on an assumption of unlimited resources. Price signals were delayed and did not drive a sufficient increase in investment into alternative sources of energy or resources in time to allow a substitution of technologies. After early investments in alternative fossil fuel extraction there was an immediate boost to some economies following lower energy prices (for example, hydraulic fracking or deep ocean drilling).

When global resource limits became apparent, short-term political issues impacted on the availability of a scarce resource (for example, embargos on oil exports by some countries were put in place at different times throughout the century), and climate events led to a significant drop in food productivity in some regions, there were abrupt and discontinuous changes to resource availability and price.

Global economic growth meant limited oil supplies became more of an immediate threat and another doubling of prices was seen over a very short period. Countries that were more exposed to this price increase than those with alternative sources of fossil fuels therefore increased investment into renewable technologies. By the middle of the century increased domestic water competition in the some countries resulted in the closure of several fracking sites. Despite some increase in productivity in agriculture (Solano Hermosilla and van Berkum, 2011), climate change led to another long-term drought in key global breadbaskets (Wood, 2012), combined with catastrophic flooding in others. This combination of local energy and food disruption led to some countries being suddenly exposed to international food, gas and energy markets again. This caused a significant shock to their economies, lowering industrial output sharply.

Some emerging economies continued to grow and expand production capacity while becoming more resource efficient. However, despite this the use of fossil fuels, in particular coal, grew rapidly, which had a significant impact on the health of the workforce in and around industrial centres (Wu et al., 2006). This lowered the industrial productivity per head resulting in higher costs and lower international competitiveness. Economic growth stagnated as international demand collapsed due to price shocks elsewhere and domestic demand being undermined by significant health and environmental impacts.

In the short term, there was a small decline in mortality rates globally because of a reduction in cold winter deaths due to temperature increases from climate change. In most developed countries, the political weight of ageing populations and a relative fall in standards of living, combined with a reticence by governments to increase retirement ages in line with ageing trends, resulted in reduced GDP growth rates (Arnott and Chaves, 2012).

Urbanization continued globally, with lower birth rates seen in urban areas, which somewhat alleviated the anticipated problem of global population growth. However, towards the end of the century climate impacts were significantly impacting mortality rates everywhere. Extreme weather events were much more common and the treatment of mental health problems (in particular depression) became increasingly difficult to financially sustain (Fritze et al., 2008). Coastal flooding caused the relocation of populations and infrastructure for large cities on every continent (in particular the new mega cities) although the majority of this movement was within countries.

Between 2020 and 2040 the financial burden of social security was focused on meeting legacy pension demands prior to the substantial increases in retirement ages globally. Limited resources meant a cut back in health spending, which had increased significantly up to 2020, leading to greater inequality and social conflict. Between 2040 and 2060 social security started to shift its focus to meeting urban environment health impacts and after 2060 social security systems were limited mostly to service calamity and emergency loans to meet rehabilitation needs following major events.

1.8. Conclusions

While climate impacts are debated in the global political arena, the scale, urgency and connectedness of the challenges explored here do not appear to be widely understood. Similarly, the future increase in resource prices and increase in demand due to growing global economic activity are receiving less political attention. Possibly this is due to the predominance of the free-market paradigm that believes that markets will naturally develop affordable alternative technologies at scale in an appropriate timeframe.

In the absence of an appropriate response at scale there is a risk of reduced and/or stagnating economic growth, reduced access to commodities and hence increased prices, reduced international and national security, increasing climate disruption and reductions to life expectancy with increases in morbidity.

The global resource system is already stressed. The interaction between food, energy, climate, water and economic systems is becoming better understood. Appropriate action is required to proactively manage future risks as well as cope with impacts already evident. The impact on social security systems will be significant.

The Global Sustainability Institute (GSI) would like to thank the Peter Dawe Charitable Trust for funding to build the Global Resource Observatory (GRO) database and model that could be used as a way to start this strategic process. In addition the GSI is grateful to the United Kingdom Institute and Faculty of Actuaries for an early award to study the impacts of resource constraints on investments. Aled Jones would like to thank Dr Catherine Cameron and Simon Brimblecombe for very useful comments during the drafting of Chapter 1.

2. Impact on social security and responses

Simon Brimblecombe and Ian Orton, International Social Security Association, Geneva, Switzerland

The first part of this report authored by the Global Sustainability Institute describes potential scenarios for climate change and resource scarcity and for the impact of these developments on social security. Resource scarcity and climate change are two of the most significant medium- and long-term risks facing social security systems and addressing classical life-cycle risks is likely to become more complicated in such an environment. More climatic volatility and resource shortages may also negatively affect economic activity thereby placing strain on social security systems, and their ability to provide and finance protection to populations. In the event of such a scenario, their role in cushioning the impact of shocks as automatic stabilizers will be increasingly called on. Addressing such potential challenges will probably require continued investment and development of focused social policy instruments such as the implementation of social protection floors and climate-sensitive social security systems.

Social security systems have important roles to play in responding to the social and economic upheaval that projections of climate change and natural resources scarcity are expected to bring through a range of measures to anticipate, adapt and respond to the impacts. Working and collaborating intelligently with other stakeholders is essential, but social security can also provide the lead on different approaches to addressing the transformation in society required.

This chapter outlines the key impacts on social security systems, how social security can play an adaptive role in helping to ameliorate adverse impacts as well as an effective preventive role. It highlights the dynamic nature of social security and how it can, and is, evolving to contend with the anticipated nature of emerging challenges. It sets out examples from ISSA member institutions of appropriate responses to the key impacts engendered by projected climate change (e.g. extreme events, displacement, social conflict) and diminishing resource availability. Specific social security response suggestions are given for both contribution-based and citizenship-based social security programmes.

Although many of the specific challenges are new and emerging, the experiences drawn from how social security institutions have responded to different crises (e.g. economic, financial and natural disaster shocks) are relevant and are here used as proxy examples of how institutions may respond effectively to sudden onset events. The utility of transferable policy responses does however have its limits. Previous crises have been irregular, infrequent and finite in duration. In the worst-case scenario, climate change will be seasonal, frequent and lasting and most likely possessing an exponential quality (i.e. comprising escalating severity and increasing frequency of climatic shocks). Such a scenario could rapidly lead to financing challenges for public policy and social security programme delivery. The additional challenge in respect of policy responses to projected climate change and natural resources scarcity is the lack of precedents and, typically, a short termism in decision-making which means that, to date, few effective measures have been undertaken to anticipate and then start to address the problems.

The section first considers the issues relating to climate change, the main impacts on social security institutions, and the measures that can and are be taken to address these impacts, before covering the same issues relating to natural resources scarcity.

2.1. Climate change

Climate change is increasingly recognized as one of the key risks facing global society in the medium and long term. [14] The uncertainty regarding the nature and magnitude of the impacts of the change add to the inherent risks for society in general and social security in particular – preparation for the changes to come are significantly more challenging than for other external factors which are arguably easier to predict, such as demographic changes. Just as demographic projections are regularly revised and updated to take into account actual experience, a similar approach is used for projections concerning climate change which are also revised due to an improvement in modelling tools.

The previous chapter considered projected likely future trends in respect of climate change as well as impacts on society. This chapter considers in detail the projected effects on social security and the measures that institutions can and should take to both mitigate and influence the impacts.

2.1.1. Impact on social security

Likely key impacts of climate change on social security:

An increase in the frequency and severity of extreme events. Climate change will have a direct impact on the demands placed on social security and the resources available to it. When such events occur, individuals face a range of challenges. Livelihoods, jobs and income flows are interrupted; basic infrastructure is lost, mortality and disease rates increase and social cohesion is threatened. The key impacts can be categorized as follows:

- *Mortality rates will change* as diseases develop and inequality in life expectancy is likely to increase. This will have an impact on the timing and amount of death benefits paid (both lump sums and dependants' benefits) but may also impact on contribution income. However, even when life expectancy does not change significantly, healthy life expectancy is likely to be affected by climate change.
- *Disability cases* are likely to increase but also change in nature. Social security administrations will need to ensure that claims are dealt with and benefits are paid out without delay. This may be challenging due to the number and complexity of claims and the lack of supporting documentation.
- Such events lead to ***business interruption*** meaning that companies may need to effect redundancies (even on a temporary basis). The response of social security administrations in ensuring proper support to employees and their direct involvement in partial unemployment schemes will be challenging.[15]
- The economic effect on businesses will also mean that ***the payment of contributions*** to social security may be difficult requiring flexibility from social security in respect of payment terms. Moreover, contribution collection and compliance measures by the administering authority may be impacted too.

Climate related human mobility rates. These rates will probably significantly increase both at a domestic and international level. Changes in migration patterns are responses to both extreme weather events and longer-term climate variability and change. Populations lacking the resources to migrate tend to experience higher exposure to extreme weather events, in both rural and urban areas, particularly in low-income developing countries.

14. See <http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/future-state-government/Documents/future-state-2030-v3.pdf>.

15. Partial unemployment schemes in Belgium and Germany, for example, proved a particularly effective approach during the crisis, helping to ensure that skilled workers were more likely to stay in employment.

The responses, both in the types of benefits provided and how they are managed and delivered, need to reflect the different situations of migrants compared to the general population. The International Organization for Migration (IOM) and the UNFCCC in the Cancun adaptation framework recognize migration and planned relocation as a likely adaptation and survival strategy to climate and environmental change;[16] the number of storms, droughts and floods has increased threefold over the last 30 years with devastating effects on vulnerable communities, particularly in developing economies. In 2008, 20 million persons were displaced by extreme weather events, compared to 4.6 million internally displaced by conflict and violence over the same period. Future forecasts vary from 25 million to 1 billion environmental migrants by 2050, moving either within their countries or across borders, on a permanent or temporary basis, with 200 million being the most widely cited estimate.[17] These migrants and displaced persons will comprise populations who need to move quickly in response to slow onset events such as storms and perhaps having often lost their livelihood and those who may migrate or have been displaced in response to slow onset events such as gradual degradation of their environment caused or exacerbated by climate change (e.g. sea level rise or droughts). The responses to the different types of climate-related human mobility need to reflect the individual circumstances of both groups, and their immediate and evolving longer-term needs with an emphasis on immediate responses for the former and longer-term support for the latter group (although both groups will have short-term and longer-term needs). Lasting changes to climate patterns will render areas of the world currently capable of sustaining life no longer economically viable or capable of supporting basic conditions of human existence. Water stress and associated conflict (for example in major river basins between upstream and downstream countries), encroaching desertification, droughts, floods and diminished melt water from shrinking glacial feeds will compel large numbers of affected person to move. By 2030, water supplies will only satisfy 60 per cent of global demand[18] while the estimated population living in water-stressed river basins in 2050 has been estimated at between 2.8 and 5.2 billion for a lower emissions scenario and up to 6.9 billion for a higher emissions assumption (IPCC, 2008). This is likely to force a part of the population concerned to move – either due to lack of resources or due to the conflicts induced by competition over water resources. These migrant flows will be sudden, unpredictable and difficult to manage leading to geo-political tension and security issues.

Environmental degradation. The environmental degradation resulting from climate change resulting from more droughts and flooding which, in turn, will result in a reduction in agricultural yields is likely to lead to demographic changes. Increases in life expectancy may stall or reverse, which in theory may have a positive financing impact on retirement systems; however, the exact impact will depend on the changes in age specific rates. Greater proportionate mortality increases at younger ages will have a more detrimental effect than increases at older ages. Given that changes in morbidity are also likely, the time spent in ill health may increase leading to pressures on health systems and a potential reduction in financing means (Box 2.1 and Box 2.2). Earlier incidence of illness may impact not only on health costs (payable for longer) but in a reduction in employee and employer contributions and income tax revenue.

The impact of environmental degradation falls particularly on the poor given the nature of the workforce in the agriculture, forestry and fishing industries. For example in Brazil, while these three sectors make up 6 per cent of GDP for the country as a whole, it is estimated that they provide work to up 90 per cent for the rural poor (Sukhdev et al., 2008). These groups will be the most affected but the least well equipped to adapt to these changes.

16. See <www.iom.int/cms/envmig>.
17. See <www.iom.int/cms/en/sites/iom/home/what-we-do/migration-and-climate-change/a-complex-nexus.html#estimates>.
18. See <www.mckinsey.com/App_Media/Reports/Water/Charting_Our_Water_Future_Full_Report_001.pdf>.

Reduction in value of reserve fund assets. While the value of assets are likely to be affected by the economic implications of the extreme events referred to above (i.e. through business interruption, degradation in assets etc.), a more immediate issue is related to the risks of investment in enterprises with potentially "stranded assets". These are assets, typically energy reserves, that are currently valued by the market at the full rate with an assumption that the company will be able to exploit and sell these reserves at market price. In reality, there is a risk related to investment in such companies – that legislation seeking to limit climate change will de facto impose limits on emissions and thus constraints on the exploitation of reserves.[19] The Carbon Tracker Initiative estimated that over half of global carbon reserves are "unburnable" (and therefore without value on this basis) representing a tangible risk for investors.

For example, to meet a temperature increase target of a maximum of 2° Celsius warming by 2100, the global carbon budget for 2000-2050 is estimated at 886 Giga tons of Carbon Dioxide (GtCO2). However, taking into account emissions in the first decade of this century, a "budget" of just 565 GtCO2 for the 40 years to 2050 remains. At the same time, the total carbon potential of the Earth's known fossil fuel reserves is estimated at 2795 GtCO2 with the fossil fuel reserves held by the top 100 listed coal companies and the top 100 listed oil and gas companies representing potential emissions of 745 GtCO2. Therefore only around 20 per cent of known reserves can be exploited; this means that if serious measures are taken, the value of listed energy companies is significantly overvalued. In 2014, a group of 70 global investors managing more than USD 3 trillion of collective assets launched a coordinated effort to force the world's 45 top oil and gas, coal and electric power companies to assess the financial risks that changes in demand and price pose to their business plans.[20]

Box 2.1. *Climate change-related extreme events and health implications*

The disruption to basic social services and infrastructure that extreme events can provoke has often immediate health consequences through an increase in infection incidence and by exacerbating existing conditions. Often climate change is impacting countries where social and health infrastructure is already under pressure. For example, according to the Red Cross extreme climate-related events had negative impacts on millions of people living with or affected by HIV, by undermining health care provision and opening up more transmission channels for opportunistic infection (IFRC, 2008). This was observed during the significantly higher incidence of natural disasters during 2007. The UNFCCC estimated that an additional 400 million people would be at risk of malaria by 2010 due to the effects of global warming (UNFCCC, 2007).

Box 2.2. *Climate change and health*

Climate change will impact on all environmental determinants of health. Major risks include thermal extremes and weather disaster-related deaths, as well as vector-borne pathologies, food-related and water-related infectious agents or air pollutants, which are sometimes aggravated by population movements exacerbated by climate change. Recent food crises highlight the impact of climate change on nutrition patterns and thus health: crops are affected by droughts, global warming, changes in the biosphere and other catastrophic events.

Health providers are increasingly concerned with their own carbon footprint and taking active steps to reduce this impact. In some cases, this is part of a strategic framework, such as the carbon reduction commitment programme of the United Kingdom, which applies to all public infrastructures, including the National Health Service. Similar trends can be observed worldwide, with social infrastructures embracing energy-saving schemes.

19. See <www.carbontracker.org/site/carbonbubble>.
20. See <www.carbontracker.org/site/carbonbubble>.

2.1.2. Responses of social security

Appropriate responses to these challenges are required if social security is to meet its objectives of providing protection against life cycle risks. The nature of the responses put in place by social security administrations will depend on the existing environment in which they operate (for example, the demographic pressures) as well as factors such as fiscal space, political will, institutional capacity and degrees of economic formality/informality existing in a country.

Although the impact of climate change will continue to evolve, many administrations are already facing extreme weather events while other examples of institutions responding to non-climate change-related shocks, such as the 2011 tsunami in Japan, highlight examples of effective measures to consider in response to such events (Box 2.3).

Governments and social security administrations can help employees and employers respond to the impact of shocks by employing a range of appropriate measures which include:

- Creation of new and specific benefits tailored to the particular circumstances of target populations impacted by climate change.
- Coverage extension to include especially affected groups (for example, the self-employed or informal-economy workers).
- Reducing, suspending or freezing contributions after extreme events.
- Increasing the duration or generosity of some benefits on a temporary basis.
- Partial or temporary unemployment schemes.

A number of these measures proved very effective in dealing with the impacts of both natural shocks (e.g. in New Zealand following the Christchurch earthquake of 2011) and the 2008 financial crisis (e.g. the partial unemployment scheme in Belgium).

The types of responses are varied and can be categorized into more shorter-term, immediate responses (often policy and administration measures taken to respond to the extreme weather events and their impacts cited above) and longer-term mitigation and preventive measures.

Box 2.3. *Response of social security in Japan to the 2011 earthquake and tsunami*

The Japanese social security system introduced over 200 different measures to respond to the aftermath of the earthquake and tsunami. Some of the measures addressed short-term needs, including deploying increased numbers of medical staff to affected regions, providing medical supplies to those having lost health insurance cards, making special unemployment insurance payments to affected people and reviewing and strengthening occupational safety measures. In addition, deadlines for the payment of social security contributions were relaxed and one-stop shops to provide information were set up. Within three weeks the 30 local pension offices affected had already reopened; at the same time, due to problems with the postal service, the population was encouraged to use the on-line service provided to allow checking of social security entitlements. Longer-term measures included reductions in social security contribution payments, extending unemployment insurance, and easing the rules for survivor claims when the member of the family had disappeared.

Source: ISSA (2013).

Short-term measures. These measures include:

- *Flexibility in benefit design and contribution payment:* In crisis situations, the type of benefits and how they are delivered needs to reflect the needs of the population directly affected. At the same time, a degree of flexibility in relation to contribution payment is required – delaying due dates for payment, allowing partial payment and temporary reductions in contribution rates are examples (Box 2.4).

Box 2.4. *The Philippines: A natural disaster-prone country responding to climate change events*

The Philippines is a hot spot for hydro-meteorological disasters. It received 70 per cent of the tropical cyclones that hit the Western North Pacific between 1948–2010 and the highest incidence of meteorological disasters from 1971–2010. Its vulnerability is compounded by having one of the longest coastlines in the world and low-lying areas highly susceptible to flooding. An array of social protection responses addressing the issues are coordinated across various branches of government:

Department of Social Welfare and Development

- Spearheads relief and rehabilitation work.
- Coordinates efforts of both government and private sectors.

Social Security System (SSS); Government Service Insurance System (GSIS)

- Grant of calamity or emergency loans at concessional rates.
- Grant of moratorium on loan amortizations.
- Advanced grant of pensions of up to 3 months.
- Accelerating procedures for processing funeral claims.

Philippine Health Insurance Corporation

- *Higher pay-out of health insurance claims*

Additional measures are now under consideration to respond to future climatic adversity. These include:
Enhanced advance pension package:

- Extend eligibility of advance pension grant to spouse-survivors claiming funeral expenses.
- Increase amount of advance pension grant beyond three months.
- An alternative to salary loan grant to pensioner's extended family members.

For the informal economy:

- Provide a range of loans, income replacement and other support through a "Livelihood programme" in partnership with accredited associations and government agencies.
- Other measures to minimise credit risk and event of loan default.

Source: Mendoza and de Quiros Jr. (2013).

- *Emergency administration response procedures.* While it is important that benefits reflect the needs of the populations affected, how benefits and services are delivered is particularly important. Extreme events may lead to disruption in communication and prevent the normal operations of government agencies and businesses. Therefore appropriate contingency plans are required to ensure services continue; demand for information and benefits is likely to increase after such events and the availability of trained staff and streamlined decision making are needed

  There are a number of positive examples of social security institutions which have efficient and effective systems for responding to one off shocks. For example, in New Zealand the social security system reacted quickly to the 2011 Christchurch earthquake by putting in place additional staff to respond to queries from the public. The response in Japan to the 2011 earthquake and tsunami included a range of different policy and administrative measures.

- *Targeted responses to vulnerable populations.* Those likely to be most affected will be vulnerable populations including the poor and those in the informal sector. However many in such groups are not covered by formal social security. Informal sector populations have few resources to deal with both the initial impact and aftermath of climatic volatility. However, governments can make a citizenship-based response to improve coverage for the 73 per cent (ILO, 2014) of the world's population not covered by comprehensive social security (Box 2.5). One way forward, is to use a social protection floor (Bachelet, 2011) approach or associated mechanisms to smooth and rationalize climatic upheaval for these groups.

An "adaptive social protection" (Box 2.6) approach could also be an important intervention, particularly for developing countries.

The Mahatma Gandhi National Rural Employment Guarantee Scheme (NREGS)[21] in India is a social protection programme that specifically assists low income groups to deal with the impact of climatic volatility.

Box 2.5. *Basic income as a "stability grant" for extreme events*

In the aftermath of climate disasters, households often face great hardships. Privations include scare basic necessities and lack of access to jobs. As well as increased mortality due to disease and trauma, such conditions can also generate extremism, bitterness and social breakdown. Such scenarios could be avoided or mitigated after the immediate impact by providing basic income security, thereby strengthening social cohesion and reducing conflict.

One approach is the payment of a nominal monthly income without conditions, acting as a time-bound "stability grant" or "reconstruction grant" in the form of basic income cash transfers that support affected communities and help to kick start recovery. The provision of basic income security can help people rebuild their lives and livelihoods, increase micro-economic activity (ILO, 2010), so that communities can reach a point of self-reliance again.

Such transfers are often considered as being the least costly and most rapid way of helping people in times of crisis after natural catastrophes, war or man-made disasters. They are also the most transparent and easiest to administer in comparison to food-for-work programmes. Although ex-ante schemes are generally more efficient at risk reduction than ex-post schemes, in certain resource constrained countries ex-post coverage may be the only possibility.*

* <www.ids.ac.uk/files/dmfile/ASP_Briefing_WebNew.pdf>.

21. See <nrega.ap.gov.in/Nregs/Home_eng.jsp>.

Box 2.6. *Adaptive social protection*

Adaptive social protection (ASP) is an integrated approach to reduce the vulnerability of poor people in developing countries. It recognizes the interlinked nature of the shocks and stresses that poor people face and the potential synergies to be gained from bringing together social protection, disaster risk reduction and climate change adaptation. Initial research suggests an ASP approach to vulnerability and poverty reduction can:

- Transform and promote livelihoods.
- Target communities with tailored assistance.
- Incorporate a rights-based rationale for action.
- Introduce a longer-term perspective for social protection and disaster risk reduction interventions.
- Enhance co-working between the natural and social sciences when designing social protection, climate change adaption and disaster risk reduction interventions.
- Introduce a social protection metric for evaluating the resilience building component of programming approaches.

This is achieved through an emphasis on public works that encompass both income security (a guarantee of 100 days of paid labour or in the absence of work, unemployment insurance) and job creation that directly protects vulnerable groups against climatic disasters. The programme therefore provides a buffer against natural shocks, encourages adaptation measures and encourages a move to more formal employment and more formal income therefore potentially entering more comprehensive and formal forms of social protection (Box 2.7).

- *Responses to increasing internal and international migration and displacement.* Both relevant policy and administrative measures can have a significant effect on improving coverage to migrant workers, in both the formal and informal sectors (ISSA, 2014).

  Policy measures which seek to extend and improve coverage to migrant workers include:

  - Extending coverage to migrant workers by including them in the definition of workers covered or adapting benefits and contribution structures. Such measures include reducing vesting requirements and waiting periods and simplifying contribution calculations.

Box 2.7. *The Indian Mahatma Gandhi National Rural Employment Guarantee Scheme (NREGS)*

The NREGS programme contributes towards responding to risk events and also provides earlier anticipatory interventions to reduce risk. The impacts on people of climate change vary, but the poor are the most vulnerable. By encouraging projects orientated towards constructing infrastructure and supporting projects focused on water conservation, water harvesting, drought prevention measures (including re-forestation and tree plantation), flood control, irrigation and horticulture (Bachelet, 2011), the programme helps insulate local communities from the adverse effects of climate change. According to the findings of the pilot study conducted in the Chitradurga District of Karnataka, there has been an increase in groundwater level and in water percolation plus an improvement in soil fertility leading to improved land productivity. The findings also suggest a reduction in water vulnerability and risks to livelihood in these areas (ILO and UNDP, 2011; Bachelet, 2011).

- Ensuring the accrued rights of migrant workers are safeguarded and that the transferability and portability of benefits are guaranteed.
- Improving exportability and portability both internally and between national schemes through the harmonization of benefit rules and setting down the procedures for recognition, transfer and payment of accrued benefits as well as ensuring appropriate coordination between different social security institutions to ensure appropriate management and administration of cases.
- Improving the adequacy of benefits for migrant workers from both compulsory and voluntary schemes through effective financing mechanisms and making such programmes attractive for migrant workers.
- Promoting multilateral and bilateral agreements and their effective management and administration.

Effective coverage of migrants also requires appropriate administrative and management measures. These include:

- Working closely with stakeholders and migrant worker organizations to support affiliation efforts;
- Setting up mobile offices[22] and simplified procedures and sign up requirements to encourage affiliation;
- Tailoring communication to migrant workers in their language and delivered using the most appropriate communication channels;
- Agreeing and administering bilateral and multilateral agreements, including record keeping, information provision, payment mechanisms and coordination with agencies nationally and in other countries;
- Using effective ICT tools to record, track and calculate entitlements and facilitate coordination with other social security systems and stakeholders.[23]

Long-term measures. These include both adaptive and anticipative measures as well as mitigating and influencing interventions which seek to reduce risks and impacts from climate change. They are particularly important if social security systems are to be able to respond effectively to the impacts they will be facing in the medium and long term but are also a reflection of the need to do more with less.

Most of the measures cited as regards short-term measures above imply increased expenditure while contribution revenue will likely fall. This will therefore put increasing financing pressure on social security administrations although the increase in migrant workers may improve, in the short and medium term, some receiving countries' social security systems. This reality raises the issue of the role social security can and should play in the medium and longer term. A broader role of social security is possible and the examples of the positive interventions cited above show that it can be an efficient and effective actor. But there are financing and management implications if the role does develop.

22. Such offices are physical and change location on a periodic basis. In the case of crises, these can be particularly effective.
23. See ISSA Guidelines on Information and Communication Technology <www.issa.int/excellence/guidelines/ict>.

Another important debate is the possible positive role of social security institutions to mitigate and influence climate change. Given the importance of social security administrations and their influence on the economy, labour market, poverty reduction and social cohesion, their role can be significant. Given the scientific consensus on the impact of human activity on global warming [24] and the significant size of reserve funds, their investment in areas which seek to mitigate and slow climate change can be important.

- *Mitigation and influencing policies and measures.* These measures seek to either mitigate the negative impacts of climate change or reduce the risk by policies which aim to reduce climate change itself or the magnitude of the resulting impact. Such programmes are often characterized by multiple aims (e.g. job creation and carbon neutral economic development) and can be particularly effective (Box 2.8).
- invest in. In the past, targeted campaigns against certain companies have proved effective, and through adopting appropriate investment policy, investors can influence economic behaviour and environmental outcomes.
- *Investment strategy of reserve funds*. Pensions funds, both public and private, are significant actors on the global stage and represent a significant body of investment funds. Through investment choices, such organizations can influence the behaviour of the companies they Reserve funds and sovereign wealth funds have an important influence, not only via the weight of funds invested and involvement in the corporate governance procedures of the companies they invest in, but by setting an example for second pillar investors. The importance of this nascent criteria is growing.

Box 2.8. *The Bolsa Verde*

The Brazilian government launched the "Green Grant Progamme" in 2011 as an additional dimension to the Bolsa Família conditional cash transfer programme. This benefit seeks to eradicate extreme poverty (through income security) while tying it to measures that seek to conserve Brazil's important ecosystems. Recipients who live in ecologically sensitive areas of the country now receive an additional payment that is made on the condition that they do not undertake harmful ecological activity, such as illegal logging.

The Bolsa Verde* was introduced as a strategy for extreme poverty eradication. In its first year it provided monthly payments of BRL 70 (about USD 35) each to about 16,634 poor families in protected public areas. There are plans to extend the coverage to 300,000 families, encompassing a broader range of measures, such as clean energy use (ILC, 2013).

The programme encourages the conservation of ecosystems, promotes citizenship and improvement of living conditions, raises the income of the extreme poor engaged in natural resource conservation activities in rural areas, and encourages the participation of beneficiaries in environmental social training. This represents an important step toward recognizing and compensating traditional communities and family farmers for the environmentally-responsible behaviour that results in benefits for the rest of society. The programme illustrates how certain behaviours can be incentivized by social protection programmes. However, there is also a risk that by considering only those in environmentally-threatened areas, the key pressure for ecological damage from consumption patterns and behaviour from the rest of society is not addressed (i.e. demand driven by lifestyle preferences of rich consumers, such as increased meat eating that increases demand for soya and further deforestation). A more holistic approach would address the issue of what type of consumption is consistent with climate change objectives as well as better reflecting the externalities resulting from current economic choices.

* <www.mma.gov.br/images/arquivo/80088/Publicacao_Green_Grant_Jan2013.pdf>.

24. Among scientific abstracts expressing a position on global warming, 97.1 per cent endorsed the consensus position that humans are causing global warming; see <http://iopscience.iop.org/1748-9326/8/2/024024>.

The 2014 ISSA Reserve Fund Monitor, which analyses the investment practices of selected ISSA member organizations, found that 70 per cent of participants had a Socially Responsible Investment policy. A number of funds actually go further and translate this into strategies that explicitly reflect these aims by investing into carbon neutral investment and investment choices which seek to mitigate climate change. This includes investment into public transport infrastructure projects and renewable energy (for example financing "green technology" and low carbon energy production). The considerations in putting in place such criteria and integrating them into the investment process should be part of the governance process (Sørensen and Pfeifer, 2011). While this movement is nascent, shareholder activity in some countries is pushing institutional investors to better reflect the risk inherent in assets which contribute to climate change. At the same time, a number of studies show that investment returns achieved on Socially Responsible Investment funds generally outperform those with no consideration for these factors. Given the likely increase in the cost of natural resources, legislative changes and regulation risk, this trend is likely to continue (Box 2.9).

- *Support of labour market transformation measures.* An increasing number of government initiatives are emerging to support a transition to employment in renewable energy and activities with a low carbon footprint. This is often part of a shift away from heavily subsidized but declining fossil fuel industries. Social security institutions can play a role in supporting these policies through training, partial unemployment schemes and changes in how other social security branches are designed (Box 2.10). More details on the role of social security in supporting labour market transformation are set out in Section 2.2.1.

Box 2.9. *Denmark's ATP*

The ATP in Denmark is a pioneer in the consideration of environmental issues in the formulation of investment policy. ATP published its first climate report in 2008 and both internal management and operations (e.g. the canteen uses local products, overwhelmingly organic and limits meat products) and investment choices reflect the responsibility criteria set out in its governance policies. However, investment in extractive industries is permitted; the investment policy "requires companies to respect the rules, norms and standards ensuing from conventions and other international agreements ratified by Denmark. This applies irrespective of whether the country in which the company is active has ratified the same agreements and conventions".*

* <www.atp.dk/X5/wps/wcm/connect/ATP/atp.com/about/omatp/investments/responsibility/>.

Box 2.10. *Employment implications of a move from fossil fuels*

One barrier to the transition towards renewable energy and lower carbon emitting industries is the perceived negative employment implications. However, the reality is that the most polluting industries represent a relatively modest share of total employment, therefore underscoring overstated social utility in terms of providing employment. In OECD countries, the seven most polluting industries account for 80 per cent of emissions, but only 10 per cent of the workforce. The ILO estimated that less than 1 per cent of all workers would need to change economic sector as a result of such a transition; to put such a figure into context, over the last twenty years, some 20 per cent of the workforce have had to change sector due to the impacts of globalization (ILC, 2013).

- *Preventive and proactive measures addressing adverse health effects.* The likely degradation in human health tied with a greater scarcity of resources will require social security institutions to look more closely at proactive and preventive measures to reduce health risks. These may include broader society based elements to encourage more healthy lifestyles. At the same time, such efforts are likely to have related positive impacts on climate change. The trend to more meat eating is particularly harmful to the environment and produces significant amounts of climate change gases.[25] At the same time, the increase in consumption of sugar, dairy products and meat has provoked a number of important and expensive health effects (e.g. cancer and diabetes) which put pressure on medical systems and leads to significant losses in productivity. In addition promoting physical activity will encourage a move away from car use (and ownership) which is particularly bad for the environment[26] while at the same time contributing to measures to combat mental health issues. Indeed it is widely accepted that there is a direct positive correlation between exercise and mental well-being (Helliwell, Layard and Sachs, 2013).
- *Alternative forms of social security and social protection.* While the impacts of climate change require an adaptation of what social security does and how it does it, there will be an increasing need to fundamentally rethink the forms of benefits and services provided. Simply responding to events and their impacts through adaptive measures will become increasingly difficult to justify due to an increase in severity and frequency of such events, but also because returning people to their original situation may no longer be a tenable nor constructive approach. Therefore not only are earlier interventions to reduce risk required, but different benefits and services need to be provided. These responses need to be consistent with other policy measures of governments (Section 1.4).
- *One example is how to respond to climate change-related human mobility.* Responses that are organized in a way that is rational and beneficial for both sending and host countries are possible, as the example of Small Islands Developing States shows. To date, climate change has been relatively benign to developed countries, but its effects in the more vulnerable South have been serious and more frequent. These countries are already bearing the brunt of climate change and a number of factors render them especially vulnerable to continued climate change. For Small Islands Developing States, these often low-lying islands are particularly vulnerable to rising seas and tropical storms, a problem that is further complicated by the fact that the majority of the population lives within 1.5 kilometres of the coast. Sea level rises threaten agricultural lands and food security through the erosion of land and increased salinity leading to crop failure. The example of Vanuatu highlights the challenges facing such countries (Box 2.11).

25. Around 10 to 35 per cent of climate change emissions are due to agriculture, with 80 per cent of this amount related to livestock farming. Beef cattle farming is a particularly inefficient way to produce protein, producing four times as much CO2 as the same quantity of chicken and around 15 times more than for soya. See <www.ewg.org> and <www.unep.org>.

26. The amount of CO2 emissions per passenger-kilometre is between 50 and 100 times greater for a car than a bicycle and between 5 and 10 times greater than for a bus.

Box 2.11. *The responses of Vanuatu to climate change*

At present social security coverage in Vanuatu is limited to statutory benefits such as an old age, survivor and disability pension for formally-employed regular employees. There is no statutory social assistance, family or unemployment insurance and the majority of the population remain uncovered. Extending social security to its population is hampered by a large rural population. Overall, 33.3 per cent of households are considered to be multidimensionally poor. Plans to establish a new Worker's Compensation law and an ILO Decent Work programme are starting to address the problem even if access to basic protection remains poor. Recognizing the need to adapt to climate change, islands such as the Solomon Islands and Vanuatu are embarking on expanding their Social Protection Floors. As a further dimension of social protection, since April 2007, Vanuatu has participated successfully in seasonal labour migration programmes with both New Zealand and Australia. Remittances from both schemes are increasingly important contributing factors in rural economic development. Moreover, this example shows how impacts of climate change on migration could be more intelligently managed to have reciprocal benefits for sending and receiving nations.

There are a number of examples where social society systems act to mitigate climate change by putting in place measures to address natural resources scarcity. Poverty is often related to either a limited access to natural resources or a relatively higher price paid for them. Social security interventions to address this through the promotion of renewable energy or energy efficient measures lead to a reduction in greenhouse gas emissions. Examples are set out in Section 2.2.2.

2.1.3. The role of social security in wider policy responses to climate change

Policy measures taken by social security need to be consistent with other policies put in place to address climate change. These include energy, employment and fiscal policies (Box 2.12).

Box 2.12. *China's multidimensional responses to impacts of climate change*

As both the largest emitter of carbon dioxide emissions and one of the most vulnerable victims to extreme weather events, China has experienced noticeable changes in its climate, with annual average air temperature rising by 0.5–0.8°C over the past 50 years, slightly higher than the world average figure.

The Chinese government has announced a range of macro measures to reduce greenhouse gas emissions (i.e. closing heavily polluting factories, prohibiting new coal-fired power stations) and promoting green technologies and green jobs. More specifically within the field of social security to help address the impacts of climate change, China has a nationwide network of integrated employment and social insurance grass-root service platforms supported by the issuance of multi-functional social security cards, portability of pension benefit and real-time online settlement for cross-provincial medical treatment fees. Such portability of benefits would allow persons displaced by climate change to move with their benefits.

Furthermore, a multitude of measures have been developed to ensure timely and adequate social security benefits in case of extreme events and help the affected people get back to jobs through social security allowances for training and re-skilling, deferred or reduced social insurance contribution payments and special loans for entrepreneurship among the unemployed (ILO and MOHR, 2010).*

* See <www.scio.gov.cn/zfbps/ndhf/2011/Document/1052718/1052718.htm>
and <www.ndrc.gov.cn/gzdt/W020131107539684396470.pdf>.

2.2. Natural resource scarcity

While the scarcity, exploitation and cost of natural resources will be exacerbated by climate change, the nature of the impacts on social security will differ. However, some of the responses of social security institutions will be common to both issues (e.g. carbon neutral investment) and will need to be coordinated with these and other measures.

As referred to in Chapter 1, the scarcity of natural resources will have direct implications for the functioning of the economy and the cost of these essential products. Dealing appropriately with these direct impacts and minimizing the subsequent negative effects such as increased conflict and migration and displacement will require appropriate responses.

Although many impacts will arise more gradually than those arising from climate change, there are a number of examples where certain "tipping points" are reached and the economic and social impacts emerge rapidly. For example, since the 1960s, fish stocks, and cod populations specifically, off the northeast coast of Newfoundland and Labrador have declined by more than 97 per cent, and despite a moratorium introduced in 1992 are still at historically low levels.[27] Such situations can have sudden and substantial economic, employment and society implications requiring appropriate and rapid responses.

Before analysing the direct impacts on social security systems and the measures that can be taken, it is worthwhile addressing the possible effects on labour markets and wages of the trends described in Chapter 1. Not only will these directly impact on social security systems but these are likely to be the key issues and challenges that institutions will need to address.

2.2.1. Impact on social security

As for climate change, natural resources scarcity will have direct impacts on social security (in terms of demand for benefits and services and financing) but also indirect through economic, demographic and society changes. One of the key changes is likely to be in the labour market and in particular the relative cost of labour compared to capital and goods and services.

In the future, the relative cost of labour compared to goods is likely to fall, reversing almost 50 years of the opposite trend. While the last thirty years has seen stagnation in real wages for many, the significant decrease in the relative cost of goods, which started in the 1960s, and greater access to cheap capital has cushioned the impact.

Fall in the price of goods. Since the 1960s, the cost of food, travel and leisure has significantly reduced in real terms. The proportion of household income spent on food in developed countries has reduced from around one third to less than 10 per cent over this period. At the same time, the costs of leisure activities and clothing have reduced to an even greater extent. The fall in the cost as a proportion of average salary of a plane ticket, a car or clothes are particularly edifying. For example, in Switzerland, the proportion of household income spent on food has decreased from 35.9 per cent in 1945 to just 7.4 per cent in 2010 and for clothing from 9.5 per cent to 2.7 per cent over the same period.[28]

27. See <faostat3.fao.org/faostat-gateway/go/to/home/E>.
28. See <www.migros.ch/generation-m/fr/developpement-durable/generation-m/magazines-du-developpement-durable.html>.

Stagnation in real wages. The fall in the proportion of GDP made up by labour has fallen in almost all countries since the 1990s.[29] In Europe and the United States, the share of income going to labour has decreased from 64 per cent in the period from 1945 to the 1980s to 58 per cent in 2014. This reduction has accelerated over the last decade, mainly due to an increase in the supply of global labour due to the liberalization of a number of emerging economies, globalization and a lower taxation of capital. In addition, after decades of relatively cheap and easily accessible natural resources, increases in commodity prices over the last decade have led to a greater pressure on labour costs resulting in stagnating or reducing real wages. In the United States, middle quintile incomes peaked in 2000 and are still 4 per cent below their level of over a decade ago. At the same time, increased migration has impacted real wages. Classical economic analysis and empirical studies indicate a downward pressure on real wages. This has been estimated as an effect of -3.5 per cent in Canada and -2.7 per cent in Norway (cited by Borjas, 2013). Cited estimates for the United States show that the net impact of immigration is positive but small and results from an effective transfer from workers to employers; while workers lose to the tune of 2.8 per cent of GDP, or USD 400 billion, employers enjoy a gain of an estimated 3.0 per cent of GDP, or USD 430 billion, resulting in a net gain of about USD 30 billion per annum or about USD 110 per native-born person. However, the gap between rich and poor increases – in the United States an average college graduate earned 1.7 times that of an early school leaver in the 1980s, this difference is now 2.7 times.

In such an environment – of increasing goods prices and stagnating or falling wages for the bottom half of the earning distribution, there is a risk of increased inequality which will again change the demand for social security interventions and the nature of these.

Some of the key impacts on social security share characteristics with the impacts of climate change referred to above, while others are specifically related to the scarcity of resources.

- *Stagnation and fall in employer and employee contributions* resulting in a reduction in financial resources available to social security systems (particularly an issue for programmes totally or partially financed by contribution income).
- *Reduction in the value of assets in social security reserve funds* due to lower growth and issues relating to business interruption, greater state involvement in strategic sectors of the economy and increasing social conflict.
- *Reduction in other forms of support* (e.g. second- and third-pillar pension provision[30] and informal support) leading to greater demands on social security systems.
- *A change in the expectations of society* regarding the nature of state interventions.
- *Reduction in disposable income* of employees putting contributory systems under stress.
- *A number of indirect impacts* including increasing number of conflicts (e.g. in relation to water) and migration and displacement flows as populations move to find resources.

29. See <stats.oecd.org/Index.aspx?queryname=345&querytype=view>.
30. As an example, in Croatia, the government is cutting back third-pillar pension subsidies in its wider attempt to cut budget deficits. See <www.ipe.com>.

2.2.2. Responses of social security

The appropriate responses that social security systems can and should take are arguably more complex than those required in response to climate change. The future impact of natural resource scarcity is still unpredictable as it will depend on human behaviour, technological advances, climate change and demographic changes amongst others. While not creating the immediate crises of extreme weather events, changes in staple prices can be sudden and dramatic leading to conflict and displacement. What is likely is that social security will be increasingly recognized as an important actor in this new and unpredictable future world.

The potential responses are split into two categories: general responses which require a realignment of the focus of social security systems and more specific responses which may be appropriate for certain country, region or populations impacted by scarcity.

General responses. A series of general responses by social security systems could include:

- *Social security systems may become the main benefit provider* for an increasing proportion of the population as second pillar and informal support falls. This will require an adaptation of the types of benefits and how they are delivered. The debate regarding the adequacy of benefits is likely to intensify (Brimblecombe, 2013).
- *Extension of coverage* will remain a priority. Non-environmental friendly behaviour is often a result of a lack of choices of poor populations; those focused on daily survival cannot afford to give priority to activities which have a longer term pay-off such as soil conservation. A minimum level of health protection and income security provides a base for longer-term planning.
- *Investment of reserve funds* will need to reflect the realities of a low, zero or negative growth world. While the responses of social security reserve funds during and after the economic and financial crisis from 2008 to 2011 provides pointers of approaches to consider,[31] these were based on a premise that economic growth would return. Therefore a longer-term adaptation will be required and a change in views on asset price appreciation. This will need to consider carbon neutral investment – for climate change reasons, but also because price increases will lead to a move away from fossil fuel consumption as supplies decline – as well as increasing infrastructure investment and investment in companies which have integrated the realities of natural resources into their investment strategy.
- *Adaptation to stagnating and falling real wages* which will impact on contribution income will also require difficult choices regarding the types of benefits and how these are targeted. This risks creating a move towards minimum benefits for all which, given the fall in other income sources, may lead to greater old-age poverty.
- *Managing benefits in a high inflation world*. After a long period of low or zero inflation, scarcity of resources and an increase in their price may lead to an inflationary environment, a situation that many economic actors are not used to. For example, ensuring that the purchasing power of retirement income remains constant requires a pension increase policy which is appropriate. An appropriate basket of goods and services against which such increases should be determined is important; these will change over time, for example when there is a substitution effect of increasing prices.

31. See ISSA website <www.issa.int>.

- *A change in the view and attitude of society* to the issue and measurement of happiness and well-being and a move away from a more materialistic to a society based on more humanistic values is not impossible if this can be cultivated or supported by governments. While income is recognized as a clear determinant in happiness levels, the effect weakens significantly after a certain level of income is obtained.[32] Indeed, a number of other factors are also important. The World Happiness Report[33] cites healthy life expectancy, social support, mental health, social interaction, independent action and exercise as some of the factors leading to a healthier life. Such a shift in attitudes will require a significant change in the role of social security systems in encouraging responses that support these contributing factors to happiness (e.g. for long-term care and mental health).

Specific responses. A series of general responses could include:

- *Addressing fossil fuel inequality*. Access to energy, safe drinking water, food and sanitation are key drivers for lifting populations out of poverty. Therefore efforts to improve access to renewable energy can therefore promote income security and poverty reduction measures. In addition, access to reliable and stable priced electricity improves business prospects (particularly for SMEs) and such projects are often important job creators. The price of energy is a crucial factor; currently the poor spend a significantly higher proportion of their income on energy, so putting in place autonomous, locally produced, renewable energy is a contributing factor to reducing poverty.
- *Financing social protection through a reduction in fossil fuel subsidies*. Subsidies for fossil fuels are estimated at approximately USD 500 to USD 600 billion annually. Contrary to public perception, the level of fossil fuel subsidies are significantly higher than those for renewable energy which amount to around USD 100 billion annually (IEA, 2013). Fossil fuel subsidies are also regressive; the majority of the benefit of such subsidies accrues to the better off with the wealthiest 20 per cent of the population enjoying some 43 per cent of the benefit from fossil fuel subsidies, while the poorest quintile gets only 7 per cent (Arze del Granado, Coady, and Gillingham, 2010). Removing such subsidies and replacing them with targeted social programmes, redistributive measures improve and the correct incentives to reduce fossil fuel consumption are put in place (Box 2.13). The IMF (2013) notes that if negative externalities from energy consumption are factored in, subsidies actually cost around USD 1.9 trillion annually – some 8 per cent of government revenues worldwide – which if reformed, could provide much needed financing for social security extension. A World Bank (2012) study indicates that those most in favour of retaining such subsidies are indeed those who most benefit – the rich – and that with detailed explanation of the merits and design of a social programme the worse off are generally open to the change (e.g. in Morocco).[34]
- *Support in the transformation of industries.* As referred to in Section 2.2.1, adaptation to climate change requires a change in employment sector for a number of those employed in carbon-intensive industries. But there will also be a need for social security administrations to support the transformation in employment which will result from the decline in certain industries

32. Layard (2005) calculates that, in societies where the average wage is above USD 20,000 per annum, income levels begin to become a less significant factor in whether people are happy or not since "additional income is not associated with extra happiness".
33. See <unsdsn.org/wp-content/uploads/2014/02/WorldHappinessReport2013_online.pdf>.
34. See <www.worldbank.org/en/news/feature/2012/05/09/real-costs-fossil-fuel-subsidies>.

(Box 2.14). Such measures will need to be both short term, responding to unemployment provoked by such changes, and long term, such as re-training.

- *Safety net programmes and food supply*. As food supplies become threatened and prices remain volatile, the linking of a social safety net programme with food supply is an innovative response to the challenges and a move away from simple one-off food aid programmes. In Ethiopia, the Productive Safety Net Programme provides guaranteed employment for five days a month in return for food transfer or a cash equivalent. The programme takes into account household size (and therefore needs); the cash payment is equivalent to USD 4 per month per family member. The programme therefore succeeds in moving from a short-term reactive measure to a more predictable transfer of food and investment in human capital.
- *Bilateral and multilateral social security agreements*. Agreements designed to facilitate voluntary flows of migrant workers may also be harnessed to support displaced workers with formal labour histories, thus better ensuring the longer-term economic security of such workers and their dependant family members.

Box 2.13. *Solar home systems in Bangladesh*

Since 2003, the installation of solar home systems ("SHS") has been a priority of the Government of Bangladesh and contributes to a number of objectives including meeting renewable energy targets and poverty reduction. By 2013, nearly 2 million households have been equipped. The project has:

- Reduced the number of households without energy, a significant factor in reducing poverty.
- Partially replaced the use of less powerful, polluting and climate-change contributing kerosene lamps. SHS households consume less than 1 litre of kerosene per month, compared to almost 3 litres per month by households without SHS. There are also direct health benefits; SHS adoption reduces respiratory disease of women by 1.2 per cent.
- Reduced the time of fuel collection (traditionally carried out by women and children).
- Encouraged a number of small scale projects (e.g. households sell mobile phone charging facilities).
- Increased the hours during which children can study for school and access to information (e.g. health related) obtained via internet, TV or radio.
- Has created an estimated 100,000 directly related jobs.
- Resulted in an increase in food consumption (with positive health impacts).

The World Bank estimates that the accrued benefits of a solar unit exceed its cost by 210 per cent.

Source: Samad et al. (2013).

Box 2.14. *Norway's fishing industry*

As a response to the overfishing off Norway's coasts and the subsequent cut in allowable fishing quotas, Norway's fishing industry virtually disappeared in the space of a decade. The Fisher's Guarantee Fund was created to provide temporary unemployment payments and debt relief. Long term measures included re-training and an active regional and rural policy. As well as re-training, measures to increase pisciculture and fish processing industries were promoted. Although fish stocks recovered, employment numbers did not. However, the employment consequences were successfully managed (ILC, 2013).

2.3. Summary of social security administration responses to climate change and natural resources scarcity

It is important to emphasize the role of social security administrations in adapting to climate change and resource scarcity through improvements on what they do and how they do it. These include a transformation in management practices and innovative administrative and communication approaches:

- *Addressing policy fragmentation:* Ensuring policy coherence and "joined-up" government across institutions responsible for the delivery of social protection in this new era of climatic uncertainty is essential. This is a particular issue in respect of labour market measures, for example when a transformation in employment market priorities requires re-training and partial unemployment measures, but is also related to more general policy measures taken (for example, in financing measures and responding to one off events) (Box 2.15).
- *Good governance:* Improving governance of fund management in relation to the investment of funds in climate-friendly/carbon neutral assets, appropriate technology and other activities requires a review of current decision making processes (Box 2.16).
- *Progressively extending coverage* to at-risk groups requires appropriate administration and management approaches to ensure that often tailored approaches work in practice. These efforts to cover at-risk groups (agricultural/fishing/seasonal workers, migrants, people living on coastlines or remote areas) need to ensure that the manner in which benefits are delivered and contributions collected are appropriate for their situations. This in turn requires that the contributory capacities of different population groups are taken into account and that effective enforcement of contribution obligations are ways to facilitate greater affiliation.

Box 2.15. *Coordination with other policy measures*

While social security can be an effective actor in not only responding to change but through earlier interventions to reduce risk, the responses have to be consistent with other policy measures. For example, governments are likely to change fiscal stimuli to reinforce employment policy (towards so called green jobs) as well as spending priorities (e.g. measures to reduce dependence on imported food, better flood defences, etc.). Social security policy responses can only be effective if consistent with wider policies. In addition, corporate sector actors are often "first movers", reacting to future changes before governments are able to. Increased coordination with the private sector on preventive measures is already occurring.

Box 2.16. *The importance of appropriate governance mechanisms to address barriers to the transformation of social security activities*

Many of the constraints which prevent a change in behaviour – at both society level and in respect of social security activities – can be addressed through appropriate management and governance procedures. For example, in respect of investment management, the main barriers to moving to an investment strategy that takes into account climate change and natural resource scarcity include not taking into account a sufficiently long-term view, disregarding social externalities, uncertainty regarding regulation, lack of knowledge, and incorrect assessment of risks. The ISSA Guidelines for the Investment of Social Security Funds set out the procedures required in these areas to ensure decision-making is based on full information and a proper analysis of risk.

- *Sharing experiences and expertise.* National administrations with successful and relevant climate adaptation experience can share this to help other administrations in the construction of climate-sensitized systems.
- *Integrate disaster and climate-sensitive monitoring and evaluation* (Ovadiya and Costella, 2013). Regular monitoring and the collection of accurate statistics are essential for evaluating performance of programmes in relation to these new challenges and for identifying good practices and weaknesses and challenges.
- *Building institutional capacity*. Existing agencies with a proven track record of trustworthiness and reliability in administering schemes can take on new responsibilities for the development of climate-aware social protection.
- *Embracing new technologies and effective use of ICT.* New technologies can assist in initial and long-term social protection responses by enabling more effective and efficient social security programmes in financially-straightened times. This is particularly relevant for managing membership affiliation, claims and in delivering benefits.

Anticipating and responding appropriately to the impacts of climate change and natural resource scarcity on social security systems will be challenging. The expected effects incorporate a large element of uncertainty and comprise a differing array of factors that are often difficult to predict. The responses of social security organizations and policy-makers will need to reflect this in the measures taken.

This chapter has highlighted the fact that such responses will include policy design and delivery issues as well as administrative measures. However what is perhaps most important is the change in mindset and management approach to respond to what is arguably the biggest issue facing society this century. A flexible and proactive approach and a constant assessment of the risks being faced by society will be needed. Nonetheless, the measures already taken by a number of often pioneering organizations show that this is not only possible but hugely beneficial. Social security systems are likely to play an important role in the future in society's responses to this issue.

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迈向充满活力的社会保障的路线图
خارطة طريق لضمان إجتماعي ديناميكي

ISSA General Secretariat

4 route des Morillons
Case postale 1
CH-1211 Geneva 22

T: +41 22 799 66 17
F: +41 22 799 85 09

E: issa@ilo.org
www.issa.int

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