

# **CLIMATE CHANGE POVERTY: THREAT TO FOOD SAFETY AND AGRICULTURALLY SUSTAINABLE DEVELOPMENT\***

## **ABSTRACT**

Climate change is already threatening the safety of the world's food supplies and unless action is taken it's only going to get worse. Extreme weather such as droughts and heavy rains are affecting agricultural productivity-and in some areas staple foods that are important to poor households in developing countries are being wiped out, resulting in higher prices to the consumers and lower income to the farmers. Considering that food is a major expenditure for the poor, this paper examines strategic interventions-both orthodox (scientific) and indigenous approaches that are being used to mitigate and adapt to climate change in order to achieve agriculturally sustainability and food security.

## **INTRODUCTION**

Tackling climate change is perhaps the environmental change we face today. Developing countries are particularly vulnerable to the impacts of climates because of their high dependence on natural resources and limited capacity to cope with these impacts.<sup>1</sup> The nexus of climate change, agriculture and food security is one of the quintessential challenges of sustainable development.<sup>2</sup> Rapid growth in many of the world's populations and economies is increasing the demand for food, energy, fiber, water and land for housing but efforts to meet these and other essential human needs are transforming the global environment and driving dangerous changes in the world's climate.<sup>3</sup>

Climate change and poverty are serious challenges to the future health and prosperity of our planet and they must be combated simultaneously, we cannot take care of one without

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\*Prof. Kola Odeku, School of Law, University of Limpopo, Turfloop Campus, Limpopo, South Africa and Prof. Edson Meyer, Director-Fort Hare Institute of Technology, University of Fort Hare, Alice, Eastern Cape, South Africa.

<sup>1</sup> Organisation for Economic Co-operation and Development: Integrating Climate Change Adaptation into Development Co-Operation: Policy Guidance. 2009.

<sup>2</sup> William C. Clark, Patti Kristjanson, Bruce Campbell, Calestous Juma, Noel M. Holbrook, Gerald Nelson and Nancy Dickson "Enhancing Food Security in an Era of Global Climate Change" 2010.

<sup>3</sup> Ibid.

addressing the other.<sup>4</sup> Changing rainfall patterns could devastate rain-fed agriculture on which so much of the population in poor countries depends to survive.<sup>5</sup> Food security is the outcome of food system processes all along the food chain and climate change will affect food security through its impacts on all components of global, national and local food systems.<sup>6</sup> Climate change will have serious impacts on the four dimensions of food security: food availability, food accessibility, food utilization and food system stability.<sup>7</sup>

This paper has been developed with the aim of compiling the existing evidence on the climate change and its impact on poverty and agricultural sustainability and it further sheds light on possible policy options to address the growing threat of climate change to poverty and possibility of insurance for farmers affected by change of climate. Agriculture is important for food security in two ways, it produces the food people eat and it provides the primary source of livelihood for 36 percent of the world's total workforce.<sup>8</sup> Agriculture and food security are inseparable and are also interlinked to poverty and climate change will affect all this concepts as a unit.

## **RESEARCH METHODOLOGY**

The method used in this research is based on the existing literature on the subject. Consequent upon this, primary and secondary sources of law such as legislation, case law, textbooks, legal scholarly journal articles, national and international instruments relating to the issues were used.

## **LITERATURE REVIEW**

According to Mohan, climate change is projected to impinge on sustainable development of most developing countries as it compounds the pressure on the natural resources and the environment associated with rapid urbanization, industrialization, and economic

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<sup>4</sup> UN Millennium Campaign “Climate change and the Millennium Development Goals” at page 1 available at [www.endpoverty2015.org](http://www.endpoverty2015.org) accessed on 17.07.2012.

<sup>5</sup> Ibid.

<sup>6</sup> FAO, Food and Agriculture Organisation of the United Nations Rome “Climate change and food security: A Framework Document” 2008.

<sup>7</sup> Ibid.

<sup>8</sup> FAO, P. 9.

development.<sup>9</sup> However, Thompson was of the opinion that whilst some claim that climate change will result in an increase in vector-borne disease, flooding, catastrophic weather events, loss of biodiversity, changes in agricultural production and other problems such are either caused or are exacerbated by poverty.<sup>10</sup> Thomson therefore suggested that tackling poverty was likely to be a better way of addressing these problems than attempting to control the climate.<sup>11</sup> Promoting sustainable development through the adoption of institutions that enable people to engage in economic activities that create wealth and lead to technological progress was therefore suggested to solve the imminent danger of poverty arising from impact of climate change.<sup>12</sup>

According to Food and Agriculture Organization of the United Nations, Agriculture is a source of climate change but also a solution to climate change if adequate sustainable production measures are adopted that hold substantial mitigation potential, and that contribute to adapt agriculture and food production systems to extreme events, raising temperatures, and increasing CO<sub>2</sub> concentration.<sup>13</sup> To adapt to climate change farmers will need to broaden their crop genetic base and use new cultivars and crop varieties.<sup>14</sup> They will need to adopt sustainable agronomic practices such as shift in sowing/planting dates, use of cover crop, live mulch and efficient management of irrigation and reduce the vulnerability of soil based agricultural production systems through the management of soil fertility, reduced tillage practices and management of the cycle of soil organic carbon more efficiently in grasslands and cropping systems.<sup>15</sup>

The high dependence of the economies and rural people upon rain fed agriculture, the prevalence of poverty and food insecurity, and limited development of institutional and infrastructural capacities in this region make coping with natural climate variability a

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<sup>9</sup> Mahmoud S Mohan C, *Food security and Climate Change in Dry Areas* (2011) 1.

<sup>10</sup> Martin Agerup, Thompson Ayodele, Jose Cordeiro, A blueprint from the sustainable Development Network: "Climate change and sustainable development".

<sup>11</sup> Ibid.

<sup>12</sup> ibid.

<sup>13</sup> FAO, United Nations Food and Agricultural Organisations, Mitigation of Climate Change in Agriculture, available <http://www.fao.org/climatechange/49373/en/> accessed 21:14 on the 17.07.2012.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

perennial challenge.<sup>16</sup> According to Mahmoud, several years ago, the number of extreme weather events in particular sub regions and the number of people affected by droughts and floods have grown dramatically.<sup>17</sup> Climate change indeed poses a grave threat, with a range of devastating consequences for humanity, and that restricting emissions now is the best response to that threat.

The Europe Governing council is of the view that as climate change becomes a more serious threat to agricultural production worldwide, existing agricultural systems are being questioned.<sup>18</sup> These systems will face even greater challenges in the future, in terms of both mitigation and adaptation to climate change. As a greenhouse gas emitter and a producer of food for a steadily increasing world population, the agricultural sector is increasingly being recognized as part of both the challenge and the solution.<sup>19</sup> One of the UN technical report has warned that climate change will act as a multiplier of existing threats to food security: It will make natural disasters more frequent and intense, land and water more scarce and difficult to access, and increases in productivity even harder to achieve. The implications for people who are poor and already food insecure and malnourished are immense.<sup>20</sup>

Everyone knows that the way humans live their daily lives affects the environment, and that changes in the environment can sometimes spell big trouble for humans. Now, scientists are warning that the way people have lived since the Industrial Revolution is catching up with us in the form of “global warming” or “global climate change.” Climate change is a serious risk to poverty reduction and threatens to undo decades of development efforts. The adverse effects of climate change are already evident, natural disasters are more frequent and more devastating and developing countries more vulnerable.”<sup>21</sup> While climate change is a global phenomenon, its negative impacts are more severely felt by poor people and poor countries.<sup>22</sup>

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<sup>16</sup> The Role of Sustainable Land Management (SLM) for Climate Change Adaptation and Mitigation in Sub-Saharan Africa (SSA) issue paper April 2009 I .

<sup>17</sup> Ibid.

<sup>18</sup> Climate change and sustainable water resources management: IFAD’s experiences in the Near East and North Africa and in Eastern and Central Europe Governing Council, 17-18 February (2010) 2.

<sup>19</sup> Ibid.

<sup>20</sup> Technical Paper for the IASC Task Force on Climate Change, Food Insecurity and Hunger,

<sup>21</sup> Chino T Poverty and Climate Change Reducing the Vulnerability of the Poor through Adaptation (2010) .

<sup>22</sup> Ibid.

They are more vulnerable because of their high dependence on natural resources, and their limited capacity to cope with climate variability and extremes. The impact of climate change on agriculture is now real and without adequate adaptation and mitigation strategies to climate change food insecurity and loss of livelihood are likely to exacerbate.<sup>23</sup>

Climate change and agriculture are interrelated processes, both of which take place on a global scale. Global warming is projected to have significant impacts on conditions affecting agriculture, including temperature, carbon dioxide, glacial run-off, precipitation and the interaction of these elements.<sup>24</sup> These conditions determine the carrying capacity of the biosphere to produce enough food for the human population and domesticated animals. The overall effect of climate change on agriculture will depend on the balance of these effects.<sup>25</sup> Assessment of the effects of global climate changes on agriculture might help to properly anticipate and adapt farming to maximize agricultural production. The ramifications of climate change are particularly evident on environment, human health, food security, human settlements, economic activities, natural resources and physical infrastructure.<sup>26</sup>

Previous analyses have unequivocally shown that investment in agricultural research has high rates of return both in terms of return and poverty reduction.<sup>27</sup> The compounded challenges of global climate change are likely to impact crop and livestock production, hydrologic balance, input supplies and other components of agricultural systems, making agriculture production much more variable than at present. Whilst rural communities are the primary ‘investors’ and risk-takers in rain-fed production, there are also a wide range of associated support agents upon whose strategies, decisions and operations they often depend.<sup>28</sup>

Farmers and agricultural stakeholders will need to adapt their tactical and strategic planning to these evolving climate risks, but given the magnitude of the existing poverty, food

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<sup>23</sup> Ibid.

<sup>24</sup> Proposal for a programme on Climate Change Impacts, Adaptation and Mitigation in Tanzania, Prepared by Sokoine University of Agriculture, in collaboration with University of Dar es Salaam; Ardhi University and the Tanzania Meteorological Agency 2009.

<sup>25</sup> Ibid.

<sup>26</sup> Ibid.

<sup>27</sup> Organisation for Economic Co-operation and Development note 1 above.

<sup>28</sup> Cooper P.J.M. Coping better with current climatic variability in the rain-fed farming systems of sub-Saharan Africa: An essential first step in adapting to future climate change? Volume 126, Issues 1–2, June 2008, pp. 24–35

security, environmental and health challenges that are faced in sub-Saharan Africa, adaptation to climate change should not and cannot be divorced from those current development priorities.<sup>29</sup> Agriculture, food security, and the climate change equation can only be comprehensively assessed if sustainable development issues are also considered, since behind agriculture and food security are farmers, foresters, fishers and other rural people.<sup>30</sup> The economic, social and environmental context and conditions of this population, and the importance of all society to enhance food security and social stability, make the consideration of the sustainable development dimension essential.<sup>31</sup>

## **NATIONAL AND INTERNATIONAL LEGAL FRAMEWORK**

Global climate change is regarded as the greatest environmental challenge facing the world this century and as a result concerned with the implications of global climate change several governments came together in 1988 and formed the International Panel on Climate Change (IPCC).<sup>32</sup> This apparently led to the United Nations Framework Convention on Climate Change (UNFCCC), which was tabled in 1992 at the United Nations Conference on Environment and Development.<sup>33</sup> The objective of the UNFCCC is to achieve stabilisation of the concentrations of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.<sup>34</sup> However it was soon recognised that the commitments set out in the UNFCCC were inadequate for achieving its ultimate objective and this led to the adoption of the Kyoto Protocol in 1997, after much international negotiation which was later acceded to by the South African Government in July 2002.<sup>35</sup>

The UNFCCC, classifies developed countries, designated as annex I countries in terms of the convention and developing countries like South Africa are classified as a non-annex I

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<sup>29</sup> Ibid.

<sup>30</sup> Integrating Sustainable Development and Climate Change In the IPCC Fourth Assessment Report (2003).

<sup>31</sup> Ibid.

<sup>32</sup> DEA, Department of Environmental Affairs, South African National Climate Change Response Strategy, at page 1, September 2004.

<sup>33</sup> Ibid. The South African Government ratified the UNFCCC in August 1997.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid. In accordance with Article 12 of the Convention South Africa prepared an Initial National Communication to the UNFCCC, in order to fulfil the requirements of the UNFCCC.

country.<sup>36</sup> The difference between the two will be that annex I countries have specific extra commitments applicable only to them. South Africa, as a non-annex I country, is not required to reduce its emissions of greenhouse gases.<sup>37</sup> In South African environmental law Climate change is referred to explicitly in the White Paper on Integrated Pollution and Waste Management policy<sup>38</sup> and referenced in the White Paper on a National Water Policy for South Africa.<sup>39</sup>

## **MITIGATION AND ADAPTATION**

In the food and agriculture sectors, adaption and mitigation often go hand in hand, so adopting an integrated strategic approach represents the best way forward. Because many mitigation actions that would have high payoffs also represent good options for adaptation within the food and agriculture sectors of low-income developing countries, it may be possible to obtain additional resources from bilateral and multilateral aid agencies, which are becoming increasingly interested in investing development resources in adaptive responses to climate change.<sup>40</sup> In addition to climate change mitigation, adaptation to the impacts of climate change is also very important.<sup>41</sup>

Adaptation relates not only to technical measures aimed at infrastructure such as higher flood dams, levees and landslide barriers, but also to enabling activities and frameworks that enhance ecosystems' resilience to cope with altered climatic conditions.<sup>42</sup> Examples of adaptation measures include re-vegetating slopes threatened by flood erosion, and maintaining the natural biodiversity of ecosystems to reduce their vulnerability.<sup>43</sup> Adaptation projects are therefore very suitable ways of achieving the complementary objectives of the Rio Conventions. The forestry and agriculture sectors are important reference points for adaptation activities, mainly through maintaining functions (such as biological and crop

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<sup>36</sup> Ibid at p. 13.

<sup>37</sup> Ibid at p. 19.

<sup>38</sup> White Paper on Intergrated Pollution and Waste Management Policy 2000.

<sup>39</sup> White Paper on a National Water Policy for South Africa of 1997.

<sup>40</sup> Climate Change and Food Security: A framework document: found at <http://www.fao.org> at 22:30 on the 15.07.2012. Food and Agriculture Organization of the United Nations Rome, 2008.

<sup>41</sup> The Climate Change Mitigation and Adaptation Information kit.

<sup>42</sup> Ibid.

<sup>43</sup> Ibid.

diversity and water generation cycles) that help determine an ecosystem's ability to withstand climate change.<sup>44</sup>

Climate change can intensify land erosion, especially in arid or semi-arid areas, alter the natural regeneration of forests, destroy and fragment habitats, affect wildlife and biodiversity, and damage water resources.<sup>45</sup> In-situ protection of biodiversity, which requires the identification, restoration, protection, recovery and linking of conservation areas, can be combined with ex-situ conservation of threatened plant and animal species.<sup>46</sup> In many cases, the continuing availability of ecosystem services of good quality and adequate quantity can best be ensured by working towards adaptation in other sectors, particularly forestry and agriculture.<sup>47</sup>

Adaptation is made up of actions throughout society, by individuals, groups and governments.<sup>48</sup> Adaptation can be motivated by many factors, including the protection of economic well-being or improvement of safety. It can be manifested in myriad ways: through market exchanges through extension of social networks, or through actions of individuals and organisations to meet their own individual or collective goals.<sup>49</sup> It can be undertaken by an individual for their own benefit or it can be made up of actions by governments and public bodies to protect their citizens.

These levels of actions take place within hierarchical structures such that the levels interact with each other. Thus, individual adaptation actions are not autonomous: they are constrained by institutional processes such as regulatory structures, property rights and social norms associated with rules in use.<sup>50</sup> The hierarchical structure extends beyond the nation state: Article 3 of the UN Framework Convention on Climate Change encourages governments to adapt to climate change, and the Delhi Ministerial Declaration on Climate Change and Sustainable Development, issued at the Eighth Conference of the Parties of the Framework Convention on Climate Change in 2002, stated that adaptation 'is of high priority. Mitigation

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<sup>44</sup> Ibid.

<sup>45</sup> William C. Clark NOTE 3, p. 21.

<sup>46</sup> Ibid.

<sup>47</sup> Ibid.

<sup>48</sup> Successful adaptation to climate change across scales: Perspectives Across Scales, 2005 15(2), pp. 77–86.

<sup>49</sup> Ibid.

<sup>50</sup> Ibid.

of climate change should stay high on the political agendas for the rest of the world.<sup>51</sup> However, despite all efforts to minimise the changes in climate change, the world needs to adapt to the coming changes as well. This adaptation to climate change is necessary to prevent societies from disasters and disruptions.<sup>52</sup>

For all countries' and that 'adaptation requires urgent attention and action on the part of all countries'. The scales of appropriate adaptation also extend to lower elements of the political and jurisdictional scale. Municipalities, cities, firms and markets are all adapting within the bounds of available technologies, regulatory systems and knowledge of future climate risks.<sup>53</sup> Some authors most have argued in favour of autonomous adaptation as the most efficient way to mitigate the impact of climate change.<sup>54</sup> There can be no question that individuals will undertake every effort to adapt to climate change. However, they will do so within the confines of the informational, budgetary and other constraints they face.<sup>55</sup>

For autonomous adaptation to be effective, and to avoid maladaptation, certain preconditions therefore have to be met. Individuals have to have the right incentives, resources, knowledge and skills to adapt efficiently.<sup>56</sup>

An important prerequisite for informed decision making on adaptation is that it should be based upon the best available information on the implications of both the current and the future climate.<sup>57</sup> To this end, the availability and quality of climate change information needs to be improved. This will involve improving the coverage and the quality of climate monitoring data, commissioning assessments of climate change impact, vulnerability and adaptation if they are not already available, and using multi-model ensembles with a clear articulation of associated uncertainties.<sup>58</sup> Until recently, most assessments of the impact of climate change on the food and agriculture sector have focused on the implications for production and global supply of food, with less consideration of other components of the food chain. Safeguarding food security in the face of climate change also implies avoiding

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<sup>51</sup> Roggema R *Adaption to Climate Change: Spatial Challenge* (2009) XXI.

<sup>52</sup> Ibid.

<sup>53</sup> Ibid.

<sup>54</sup> Supra (n3).

<sup>55</sup> Ibid.

<sup>56</sup> Ibid.

<sup>57</sup> Organisation for Economic Co-operation and Development: *Integrating Climate Change Adaptation into Development Co-Operation: Policy Guidance*. 2009.

<sup>58</sup> Ibid.

the disruptions or declines in global and local food supplies that could result from changes in temperature and precipitation regimes and new patterns of pests and diseases.<sup>59</sup>

Agriculture is already under stress as a result of population increase, industrialisation and urbanisation, competition over resource use, degradation of resources, and insufficient public spending for rural infrastructure and services. The impact of climate change is likely to exacerbate these stresses even further.<sup>60</sup> Proposed climate change adaptation strategies centred on increasing agricultural productivity and making agriculture, including livestock, fishery and forestry, less vulnerable to climate stress and shocks.<sup>61</sup> Water management for agricultural production is a critical component that needs to adapt in the face of both climate and socio-economic pressures in the coming decades.<sup>62</sup>

Sustainable forest management, including agro-forestry and a reduction of deforestation, along with mitigation strategies in agriculture such as enhancing soil carbon sequestration, improved livestock management and better management of crop and livestock waste, could contribute to global greenhouse gas mitigation, while at the same time improving soil fertility, boosting yields, and enhancing ecosystem services.<sup>63</sup> Coherent policies for linking such adaptation and mitigation measures in agriculture will be central not only to a sustainable green revolution but also to stemming the impacts of global warming.<sup>64</sup>

The goal of increasing food production is both externally and internally challenged by various factors. External factors such as natural calamities like droughts and floods are well beyond the control of the local subsistence farmer.<sup>65</sup> Other broad external factors include poor farming technologies and bad government policies.<sup>66</sup> Internal factors include pests, soil

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<sup>59</sup> Ibid.

<sup>60</sup> Ludi E, Climate change, water and food security (2009) 1.

<sup>61</sup> Ibid at 5.

<sup>62</sup> Ibid.

<sup>63</sup> United Nations Commission on Sustainable Development May 2009 2, A “green Revolution-Sustainable solutions for agriculture.

<sup>64</sup> Ibid.

<sup>65</sup> J Wabbi, Assessing Factors Affecting Adoption of Agricultural Technologies: The Case of Integrated Pest Management (IPM) in Kumi District, Eastern Uganda, Master’s thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfilment of the requirements for the degree of Master of Science in Agricultural and Applied Economics.

<sup>66</sup> Ibid.

infertility, land availability and population increase with a subsequent rise in food demand. Although these broad external and internal factors may not be directly controllable, they can be influenced by human behaviour.<sup>67</sup>

## **CLIMATE CHANGE, FOOD SECURITY AND POVERTY**

Climate change is a serious risk to poverty reduction and threatens to undo decades of development efforts.<sup>68</sup> The UN Millennium Campaign was based on the notion that we cannot fight climate change without considering the rising energy needs of poor people and countries, nor can we effectively address global poverty without accounting for the impacts of climate change on agriculture, disease patterns and severe weather events, all of which particularly impact the poorest countries.<sup>69</sup>

Agriculture is the most important sector for most little developed countries as the impact of agricultural growth on poverty reduction tends to exceed the impact of growth in other sectors. Food security is a function of several interacting factors, including food production as well as food purchasing power. Climate change could worsen the prevalence of hunger through direct negative effects on production and indirect impacts on purchasing powers.<sup>70</sup>

The impacts of climate change on food security are now a real concern. Addressing these complex challenges, with opportunities to harness new innovations, will require out-of-the-box solutions (technology, institutions, policies, and higher investment).<sup>71</sup>

The impact of climate change on food security will be a major concern for Africa. In conjunction with the previously discussed changes in water supply, the production losses for Sub-Saharan countries could be substantial as the length of suitable growing periods

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<sup>67</sup> Ibid.

<sup>68</sup> Poverty and climate change: reducing the vulnerability of the poor through adaption

<sup>69</sup> UN Millennium Campaign “Climate change and the Millennium Development Goals” available at [www.endpoverty2015.org](http://www.endpoverty2015.org) accessed on 17.07.2012.

<sup>70</sup> Martin Agerup, Thompson Ayodele, Jose Cordeiro, A blueprint from the sustainable Development Network: “Climate change and sustainable development”.

<sup>71</sup> Mahmoud S Mohan C, *Food security and Climate Change in Dry Areas* (2011) 1.

decreases. Livestock activities and crop yields for many countries in Asia and Latin America are also projected to decrease.<sup>72</sup>

Climate change is likely to make matters worse with increases in rainfall variability being predicted. The ability of agricultural communities and agricultural stakeholders to cope better with the constraints and opportunities of current climate variability must first be enhanced for them to be able to adapt to climate change and the predicted future increase in climate variability.<sup>73</sup>

Tools and approaches are now available that allow for a better understanding, characterization and mapping of the agricultural implications of climate variability and the development of climate risk management strategies specifically tailored to stakeholders needs.<sup>74</sup> Sudhakaran et al work on sustainable agriculture and climate change where the impact of climatic changes on the agricultural system is very relevant arguing that the atmospheric conditions determine the carrying capacities of the biosphere to produce enough food for human population and domesticated animals.<sup>75</sup>

Agriculture, forestry and fisheries are all sensitive to climate and their production processes are therefore likely to be affected by climate change.<sup>76</sup> The framework document on climate change and food security revealed that there are two kinds of the food security implications of changes in agricultural production patterns and performance, namely<sup>77</sup>:

- Impacts on the production of food will affect food supply at the global and local levels. Globally, higher yields in temperate regions could offset lower yields in tropical regions. However, in many low-income countries with limited financial capacity to trade and high dependence on their own production to cover food

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<sup>72</sup> Martin Agerup, Thompson Ayodele, Jose Cordeiro, A blueprint from the sustainable Development Network: “Climate change and sustainable development” page 9

<sup>73</sup> Cooper J Coping better with current climatic variability in the rain-fed farming systems of sub-Saharan Africa: An essential first step in adapting to future climate change? Volume 126, Issues 1–2, June 2008, Pages 24–35

<sup>74</sup> Ibid.

<sup>75</sup> Sunandu Sudhakaran; S. P. Singh and D.K. Nauriyal Journal of Sustainable Development and Environmental Protection: “Sustainable Agriculture and Climate Change” Vol. 1, June 2011.

<sup>76</sup> Food and Agriculture Organisation of the United Nations Rome “Climate change and food security: A Framework Document” 2008.

<sup>77</sup> Ibid, p. 11.

requirements, it may not be possible to offset declines in local supply without increasing reliance on food aid.

- Impacts on all forms of agricultural production will affect livelihoods and access to food. Producer groups that are less able to deal with climate change, such as the rural poor in developing countries, risk having their safety and welfare compromised.

A paper on Enhancing food security in an era of global climate change recognised that there is a need for more strategic options to reduce carbon emissions from agriculture without compromising food security.<sup>78</sup> Further that whilst there is a desire for “win-win” interventions that could significantly increase food production and decrease greenhouse gas emissions from agriculture, identified options were surprisingly scarce.<sup>79</sup> They were of the view that in order to identify such strategic options, tools that enable decision-makers to compare how particular choices would score on multiple criteria might be an appropriate research outcome.<sup>80</sup>

## **ENSURING FOOD SECURITY IN A CHANGING CLIMATE**

In order to ensure food security in a changing climate there are four main entry points for adaptation and risk reduction strategies aiming at increased food security in view of climate change and that part of the solution was to increase food availability.<sup>81</sup> Further that another way lies in strategies that ensure that those who are at greatest risk of hunger can actually access and benefit from increased amounts of food and that protect the most vulnerable from the immediate impacts of climate change and this involved improving disaster risk management, enhancing social protection schemes (including the delivery of direct nutrition interventions) and strengthening resilient community based development.<sup>82</sup>

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<sup>78</sup> William C. Clark, Patti Kristjanson, Bruce Campbell, Calestous Juma, Noel M. Holbrook, Gerald Nelson and Nancy Dickson “Enhancing Food Security in an Era of Global Climate Change” 2010 at page 8.

<sup>79</sup> Ibid.

<sup>80</sup> Ibid.

<sup>81</sup> IASC Task Force on Climate Change: Submitted by WFP, FAO, IFRC and OXFAM, as well as WHO, WVI, CARE, CARITAS and Save the Children “Climate Change, Food Insecurity and Hunger”, Key Messages for UNFCCC Negotiators, November 2009.

<sup>82</sup> Ibid.

## **Increasing Agricultural Productivity, Resilience and Sustainability.**

Undoubtedly, the traditional coping mechanisms would not be sufficient to ensure food security and prevent effects on nutritional status but rather that they must be complemented by the introduction of technical innovations and enabling frameworks.<sup>83</sup> Accordingly, more research is needed on the breeding of new and adapted as well as the preservation of traditional, locally adapted varieties that can tolerate climate variability and are suitable for changed climatic conditions; the development of innovative but practical technologies such as alternative cropping systems, conservation and precision agriculture, and sustainable forest management; and the application and improvement of technologies for more efficient use of inputs such as energy, fertilizer, water, seeds.<sup>84</sup> Consequently, regarding technological innovations in agriculture, it is crucial that they would be easily accessible and affordable for the communities in need and that adaptation strategies must also be supported by strong institutions and enabling policy and legal frameworks.<sup>85</sup>

## **Improving Disaster Risk Management**

As climate change leads progressively towards increased extremes storms, droughts, and high temperatures the challenge to the humanitarian community is not only to respond to the crises, but also to be better prepared and to be able to manage the risks more effectively.<sup>86</sup>

They are of the view that this can be achieved by:

- Understanding of risks and vulnerabilities in terms of who are the vulnerable, where they are and why they are vulnerable to Plan appropriate risk reduction and response.
- Realising the need for improved monitoring, information systems and forward looking risk analysis.
- Putting Efforts to target the poorest and food insecure people without assets and entitlements in risk reduction or response interventions.

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<sup>83</sup> IASC Task Force on Climate Change: Submitted by WFP, FAO, IFRC and OXFAM, as well as WHO, WVI, CARE, CARITAS and Save the Children “Climate Change, Food Insecurity and Hunger”, Key Messages for UNFCCC Negotiators, November 2009 at page5.

<sup>84</sup> Ibid.

<sup>85</sup> Ibid.

<sup>86</sup> IASC Task Force on Climate Change: Submitted by WFP, FAO, IFRC and OXFAM, as well as WHO, WVI, CARE, CARITAS and Save the Children “Climate Change, Food Insecurity and Hunger”, Key Messages for UNFCCC Negotiators, November 2009 at page5.

- Disaster risk management and climate change adaptation management should be linked and better integrated into national development plans and strategies, starting from poverty reduction strategies, food security strategies and sustainable development.
- The gaps between sectoral organizations must be bridged in order to share timely and relevant information concerning risks and their management.
- Climate information must be made accessible to affected communities and decision-makers.
- Sufficient financial resources must be a prerequisite for effective disaster risk reduction as current practice indicates that less financial resources are being made available for disaster risk reduction than for adaptation.

### **Enhancing Social Protection Schemes**

Adapting food production systems has the potential to significantly increase the resilience of poor farmers to changing climate conditions but since the vast majority do not have sufficient capacities and resources in order to adapt to or cope with the risks posed by climate change.<sup>87</sup>

Social protection encompasses essential nutrition interventions, such as the distribution of micronutrient supplements for mothers and young children as well as fortification of foods as appropriate, and the treatment of severe acute malnutrition.<sup>88</sup>

### **Strengthening Resilient Community-Based Development**

Achieving resilient communities, which involves people achieving increased material welfare and reduced risk, is bound up with people attaining greater capacity to determine their own destiny and realised three crucial factors: (a) The prospect of major new investment flows focused on previously neglected lands, (b) Incentivizing farmers through investments in agroecological practices and in providing environmental services, and (c) Communities influencing policy making and implementation.<sup>89</sup>

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<sup>87</sup> Ibid at page 6.

<sup>88</sup> Ibid.

<sup>89</sup> IASC Task Force on Climate Change: Submitted by WFP, FAO, IFRC and OXFAM, as well as WHO, WVI, CARE, CARITAS and Save the Children “Climate Change, Food Insecurity and Hunger”, Key Messages for UNFCCC Negotiators, November 2009 at page 7.

The likelihood of future threats emerging as a result of climate change have been foreseen and extra investment is needed to establish more sustainable water management practices, to promote crop diversification and to encourage farmers to conduct their agricultural activities in other locations.<sup>90</sup>

### **Possibility of Insurance for farmer against damage caused by climate change**

India is said to be highly vulnerable to the effects of climate change due to its long coastline, dependence on agriculture and reliance on the annual monsoon and this requires it to have comprehensive climate change adaptation planning.<sup>91</sup> Fisher and Surminski argued that the commercial viability of crop insurance must be considered before private insurance companies can play an effective role in climate change adaptation.<sup>92</sup> Since farmers are particularly at risk of suffering due to climate change they must then rely on the benefit from robust crop insurance regimes.<sup>93</sup>

It was also contended that crop insurance is an important tool for risk transfer in the current climate as insurance risk transfer has been used for centuries as a tool to manage the risk of uncertain losses.<sup>94</sup> However Indian farmers are said to have relied on crop insurance since the 1970s. The National Agricultural Insurance Scheme (NAIS) which is currently the largest crop insurance scheme in the world, insuring 25 million farmers is one of the schemes used in India.

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<sup>90</sup> Oxfam International “Agriculture and Poverty” available at <http://www.oxfam.org/en/node/2037> accessed on 21.07.2012.

<sup>91</sup> Susannah Fisher, Post-Doctoral Researcher at Grantham Research Institute and Swenja Surminski, Senior Research Fellow at Grantham Research Institute “Climate change in India: what role for insurance and the private sector?” Grantham Research Institute on Climate Change and the Environment available at <http://www2.lse.ac.uk/GranthamInstitute/Media/Commentary/2012/July/climate-change-india-insurance-private-sector.aspx> accessed on 24.07.12

<sup>92</sup> Ibid.

<sup>93</sup> Ibid.

<sup>94</sup> Susannah Fisher, Post-Doctoral Researcher at Grantham Research Institute and Swenja Surminski, Senior Research Fellow at Grantham Research Institute “Climate change in India: what role for insurance and the private sector?” Grantham Research Institute on Climate Change and the Environment.

Possible ways of insuring against the risk were recommended through the use of public schemes such as NAIS, modified NAIS, and the Weather-Based Crop Insurance Scheme (WBCIS).<sup>95</sup> In India, crop insurance has clearly played an important role in supporting Indian farmers through the losses incurred during drought years but questioned whether insurance is in fact an adaptation measure and concluded that this shall remain an open question and not just for India.<sup>96</sup> It seems as if crop insurance is a possibility that countries will have to consider as an adaptive measure to protect farmers and reduce poverty caused by climate change.

## **Conclusion**

Climate change is not only an environmental concern but also a development concern.<sup>97</sup> This means that climate change as an issue must come out of the environmental problems to take centre stage as a major development problem. The promising anticipatory adaptations are changes in behavioural patterns, human practices and international actions.<sup>98</sup> However, these types of adaptations meet serious institutional constraints and consequently should be carefully prepared and, if possible, integrated in existing structures and procedures.<sup>99</sup>

Climate change poses an unprecedented challenge to the aim of eradicating hunger and poverty.<sup>100</sup> In order to meet the growing demand for food security and nutrition under increasingly difficult climatic conditions and in a situation of diminishing resources, the world must urgently move towards embracing a two-fold approach: First, we must invest in and support the development of more efficient, sustainable and resilient food production

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<sup>95</sup> Weather based Crop Insurance Scheme (WBCIS) operates on the concept of “Area Approach” i.e., for the purposes of compensation, a ‘Reference Unit Area (RUA)’ shall be deemed to be a homogeneous unit of Insurance. This RUA shall be notified before the commencement of the season by the State Government and all the insured cultivators of a particular insured crop in that Area will be deemed to be on par in the assessment of claims. India development gate way available at <http://www.indg.in/agriculture/schemes/weather-based-crop-insurance-scheme-wbcis/> accessed on 24.7.12

<sup>96</sup> Ibid.

<sup>97</sup> Harun-ur-Rashid M Adaptation to Climate Change for Sustainable Development of Bangladesh Agriculture, Presented in the 3<sup>rd</sup> session of technical committee of Asian and Pacific centre for Agricultural Engineering and Machinery (APCAEM) on November 20-21 Beijing, China.

<sup>98</sup> Ibid.

<sup>99</sup> Ibid.

<sup>100</sup> Technical Paper for the IASC Task Force on Climate Change, Food Insecurity and Hunger,

systems.<sup>101</sup> Second, we must improve access to adequate food and nutrition by the most vulnerable and at risk populations and communities and enhance social protection systems and safety nets as part of the adaptation agenda.<sup>102</sup>

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<sup>101</sup> Technical Paper for the IASC Task Force on Climate Change, Food Insecurity and Hunger,

<sup>102</sup> Technical Paper for the IASC Task Force on Climate Change, Food Insecurity and Hunger