

Developing Social Resilience Amidst Climate Change and Global Insecurity: Finding Peaceful Pathways to the Future

Ruth A. Reck, Professor of Land, Air and Water Resources. University of California, Davis

Abstract

The time for discussing pending climate change is past. Climate change is now upon us and it becomes prudent to consider, how do we improve our ability to adapt to a world of growing environmental and political insecurity? How do we deal with the social consequences of climatic change where political factions make local and regional adaptation a high risk process? Developed countries have much to lose if the consequences of consequences are not dealt with adequately, with fairness and respect for the rights of individuals. This paper will begin to lay out a framework upon which the principles of climate change and social struggle could be dealt with together.

Introduction

Today the fabric of earth's civilization is being challenged by the random forces of climate change. As far as we know from recorded history never before has there been as many people living on earth to face these ominous forces. But our resources are strong and it is our fate, working together, to face these growing obstacles to our future.

As of 18:30 GMT 22 July 2008, the world population was estimated to be 6,711,751,214, the world rate of increase being nearly half of its peak value which was, 2.2 % per year, in 1963.¹ Even with this decreased rate of growth world population is expected to reach the 9 billion mark by ~2042²³. The distribution of the growth rate by country is shown in **Figure 1**.

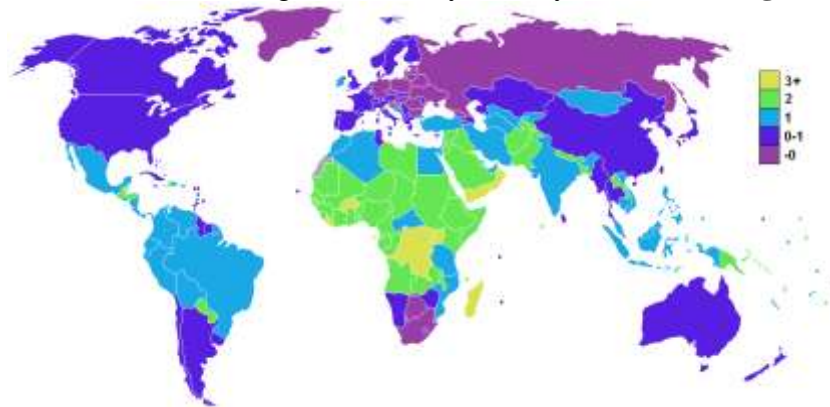


Figure 1. Distribution of the percentage growth rate per year of countries of the world.⁴

“China and India, the only two countries to have a population greater than 1 billion, together possess more than a third of the world's population.”⁵ We should take note of the fact that all the countries with the highest growth rates are in Africa, the Middle East and Asia as well as Central and South America, Mongolia and Malaysia.

¹ International Data Base, U. S. Census Bureau. Internet.

² Worldometer, World Population Updated in Real Time, 21 July 2008, Internet.

³ World Population, US Census Bureau, 21 July 2008, Internet.

⁴ World Population, Wikipedia, 24 July 2008.

⁵ Ibid.

It follows that within this uneven distribution of world population and growth is an uneven distribution of wealth as shown in **Figure 2** shown below.

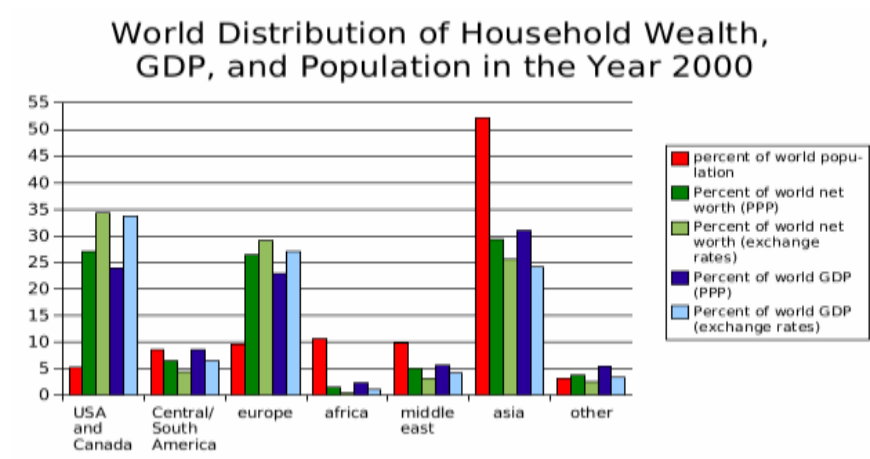


Figure 2. World Household Wealth by Region, for the year 2000.

Comparing **Figures 1 and 2** we see that the countries with the highest growth rates and highest current populations are the ones with the least percent of world GDP. Africa, Asia, Central and South America and the Middle East house the poorest people while the developed world, the USA, Canada, and Europe hold the highest per capita percentage of net worth.⁶⁷ It's an unfortunate fact that these inequities are on a growing curve with the span becoming ever wider. Amongst the wealthy, measured in local currencies, the total in 2006 grew by 7.5 percent to reach \$97.9 trillion, this being the fifth consecutive year of expanding wealth. Paralleling this growth in population and the wealth-poor divide is an ever growing list of countries suffering poverty and poor governance.

Evidence for the Concern about Climate Change⁸

Today scientific methods, both inductive, deductive and falsifiable lead to the conclusion that the earth's global climate is changing as a result of human activity. There is a strong consilience of evidence through both instrumental and proxy records to support these conclusions. Furthermore, the predicted effects are now being observed by measurements. All available evidence points towards the role that human activities have lead to the change with that inference being the best explanation for what is being observed. All the best scientific community standards have been upheld in making the measurements, the modeling and in reaching the conclusions and we can only conclude that the best explanation for what is being observed is the human induced change of climate.

⁶ Ibid.

⁷ "In September 2007, the International Monetary Fund estimated that Sovereign Wealth Funds manage \$3 trillion in assets; private investment banks have forecast that they could grow to \$12 trillion by 2015." From the Brookings Doha Center Policy Luncheon, 26 May, 2008, Rising Oil Prices and the Growth of gulf Sovereign Wealth funds, Hosted by Dr. Brad Setser, Council on Foreign Relations Fellow at the Maurice R. Greenberg Center for Geoeconomic Studies.

⁸ The author is in the Department of History and Science Studies Program, University of California at San Diego, La Jolla, CA 92093, USA. E-mail: noreskes@ucsd.edu

The Current Climate Situation

The 4th Assessment by the Intergovernmental Panel on Climate Change⁹ states that the rate of mean temperature increase in the last 50 years is twice the 100-year mean increase of $0.74^{\circ}\text{C} \pm 0.18^{\circ}\text{C}$. It is reported that land regions have warmed faster than oceans, which was expected due to the difference in heat capacity between the air and water. However, at the water's surface, sea surface temperatures have shown a strong warming trend also. As was predicted by our climate modeling results, average Arctic air temperatures increased at twice the rate of the global average. And consistent with our understanding of the greenhouse effect, lower stratospheric temperatures have been observed to cool since 1970.

Coupling with these temperature changes have also been observed changes in the hydrologic cycle. Precipitation has increased poleward from 30°N latitude from 1900-2005, while a decrease in precipitation has dominated in the tropics. Consistent with this trend, droughts have been more common in the tropics and subtropics, especially since 1970. Accompanying the increased activity in the hydrologic cycle the tropospheric water vapor has increased.

Along with the changes in temperature and precipitation have been changes in the large-scale circulation. Increases in the mid-latitude westerlies have been observed in both hemispheres with intense tropical cycle activity since ~1970. These observed increases in temperature are consistent with the observed changes in the cryosphere and with the oceans.

How will the earth respond to these changes?

Podesta and Ogden¹⁰ have discussed the consequences of the 4th IPCC Assessment in some detail from the perspective of the US. They conclude: "No foreseeable political or technological solution will enable us to avert many of these climatic impacts even if, for instance, the United States were in the near future to enter into an international carbon cap-and-trade system."¹¹ They go on to say: "The geopolitical consequence of this anticipated climate is determined by the local political, social and economic factors as much as by the magnitude of the climatic shift itself." It is the consequences of these social factors that are the consideration of the topic presented here. Because the responses of the earth show considerable inertia we are left to plan our responses to the changes which inevitably occur. It is the near term adaptation processes which are the topic of the present discussion. The inertia of the system ensures that changes will occur, even if drastic measures are taken today to limit the emissions of greenhouse gases. But there is a second "wrinkle" to the problem which will be discussed in the next section.

Climate Change since the IPCC 4th Assessment

⁹ Climate Change 2007: The Physical Science Basis, published by Cambridge University Press, New York, N. Y. 996 pages.

¹⁰ John Podesta and Peter Ogden, The Security Implications of Climate Change, The Washington Quarterly, Winter 2007-8, 115-138.

¹¹ Ibid

The IPCC 4th Assessment conclusions were based upon information and research, largely acquired several years earlier than 2007 as the review process grinds slowly and reaching worldwide consensus on the scientific conclusions often requires considerable effort and painstaking work. That is unfortunate for our world at the present time. The conclusions do not appear to be in the wrong direction, far from it. They appear to be too conservative, that is, the rates of change appear to be greater than was expected from research available to the scientists.

Today climate appears to be changing at a greatly accelerated rate. In the Arctic the ice cap has been collapsing at an unprecedented rate, stunning in its extent, as an area almost twice the size of Britain was reported to disappear within a single week in September 2007¹². A very well known and respected American scientist (R. Corell) reported that the ice was moving at 2 meters an hour on a front 5 km long and ~1,500 m deep.¹³

Accompanying the melting of the Greenland ice cap, the moving of the ice appears to have been so rapid as to have triggered minor earthquakes as pieces of ice weighing on the order of several billion tons each have broken off from the ice sheet, sliding into the Arctic seas.¹⁴ Corell reports that some Arctic scientists now believe the IPCC 4th Assessment estimates of sea level change of, at most, 0.59 m should be replaced by estimates of as much as 2 meters during the present century.

Accompanying the temperature increases have been an accelerated rate of mountain glacier melting. Brown reports that the current melting of the Gangotri glacier is likely to lead to the Ganges river becoming a seasonal river, and the glacier on the Tibet-Qunghai Plateau that feeds the Yellow and Yangtze rivers is melting at a rate of 7%/yr, estimating that the melt water will completely disappear by ~2060.

Furthermore, glaciers in the Himalayas that feed the Ganges, Mekong, Yantze, Indus and Yellow rivers could completely disappear. These are the rivers that today irrigate the rice and wheat fields of Southeast Asia. And all these accelerated changes fail to consider the possibilities of extreme events, cyclones, hurricanes, intense storms that can devastate a local region of the earth. While the climate refugees of hurricane Katrina and the cyclone in Myanmar dominated the world media for days and weeks, this is likely to be multiplied by many times, and in far more disadvantaged regions of the world, as we look to the future.

The World Political Situation as it is Impacted by Climate Change¹⁵

To understand the impacts of these accelerating climate changes we need to determine the current political situation of people world wide. The summation of the inequities mentioned previously leads to a plethora of failing states (countries) with conflict and violence being the common situation. Within the world of changing climate “there are 46 countries- home to 2.7

¹² Guardian in London, September 2007, taken from Lester R. Brown, Plan B 3.0: Mobilizing to Save Civilization, W. W. Norton and Co. New York, N.Y., 2008, p.1.

¹³ Robert Corell, chairman of the Arctic Climate Impact Assessment.

¹⁴ The Guardian in London, report from a symposium in Ilulissat, Greenland.

¹⁵ Dan Smith and Janani Vivekananda, A Climate of Conflict; Understanding Conflict, November, 2007, International Alert, 44 pages.

billion people- in which the effects of climate change interacting with economic, social and political problems will create a high risk of violent conflict. There is a second group of 56 countries where the institutions of government will have great difficulty taking the strain of climate change on top of their other current challenges.” “These 56 countries are home to 1.2 billion people”.¹⁶

We at this point we must recognize that the effects of climate change must be put into a much larger framework than has been common in the past and to develop an understanding beyond the physical science perspective of climate scientists. We must seek to understand how the developing climate crisis interacts within the socio-economic and political framework and to identify the problems of the future that the world must face.

Figure 3 shows two maps, one of the political stability of major states and a second map in the lower right of the figure shows the consequences of projected climate changes.¹⁷ On the larger map the states in *red* represent states facing a high risk of armed conflict as a consequence of climate change, *tan* represents states facing a high risk of political instability as a consequence of climate change, and *grey* represents the other states possessing a moderate or less risk attached to their political stability as a result of climate change. In the encircled portion of the larger map the magnitude of the scale has been magnified for ease of reading. In the smaller map the *dark green* represents serious climatic extremes being expected, while the *lighter green* depicts a moderate climatic significance.

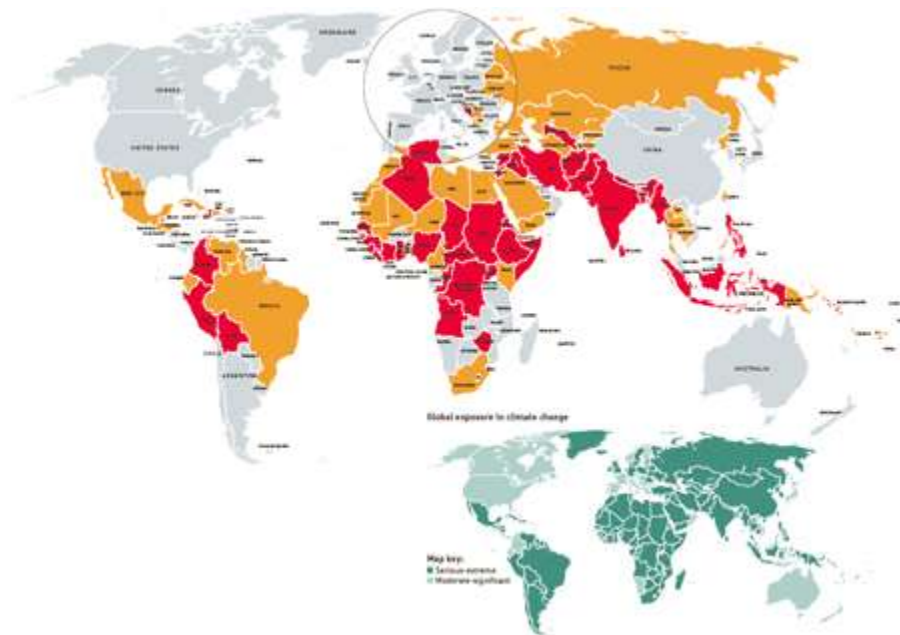


Figure 3. Political stability in countries around the world and a secondary map showing the effects of projected climatic changes.

¹⁶ Ibid.

¹⁷ Ibid

The European Peacebuilding Liaison Office¹⁸ reports that a range of threats are likely to impact the climatically ravaged states. These can include a range of factors from a lack of accountability and transparency in the security and justice areas to large numbers of combatants with few skills or economic opportunities wondering streets carrying a range of weapons, typically uncontrolled circulation of small arms and light weaponry.

Conditions vary from state to state but the lack of central governance and the rule of law make helping these types of states extremely problematic. Usually factions have developed ahead of the crises and locals can revert to mob rule as a means to bring some control to their lives. In these times food and safe drinking water are held hostage with the most vulnerable people being women and children. In populations where the average age is very low there may be a lack of family ties which can further add to the chaotic situation on the ground.

In general the complex interconnected factors that jeopardize or establish security for a state may be categorized by four quantities: governance, reconciliation, justice and economic development. To illustrate the nature of these factors we may represent the political condition of a state by the Venn diagram shown in **Figure 4**, below.

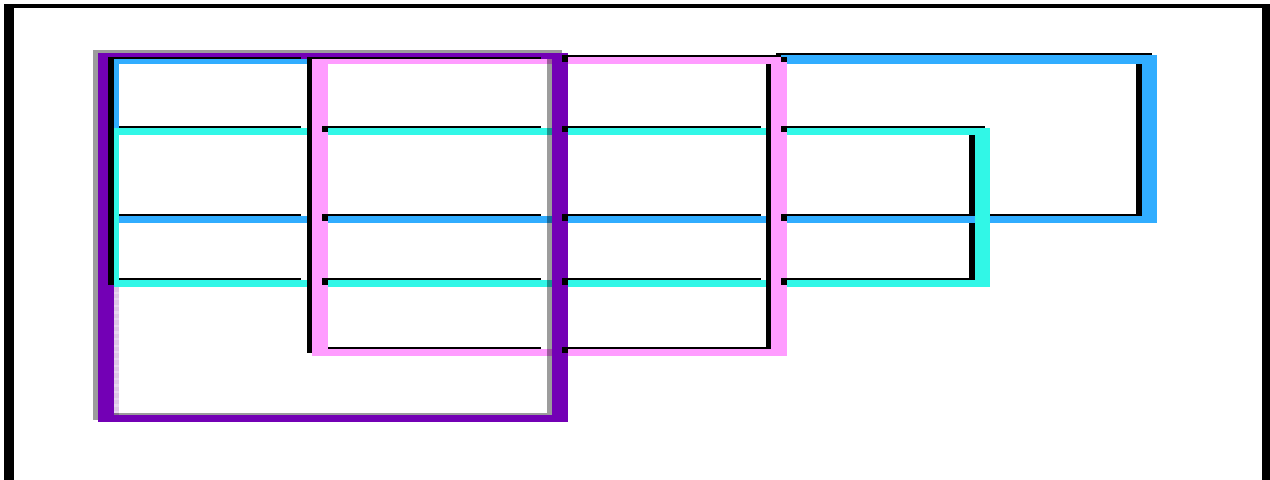


Figure 4. Venn diagram showing four sets: governance, reconciliation, justice and economic development.

Each of the four rectangles represents one of a set of four factors important in defining the state's political condition: starting on the left with governance (purple rectangle), then reconciliation (pink rectangle), then justice (light green rectangle) and finally economic development (blue rectangle). The vertical axis is meant to represent the quantities (numbers) of people concerned with each of the factors. Values near the top are shared by the most people, going down to the bottom which represents their relative importance to the most elite of the group, those educated and in charge, the ruling class. Each of the overlaps defines one of 15 different areas defined by

¹⁸ The European Peacebuilding Liaison Office composed of NGOs, networks and think tanks, is active in the field of peacebuilding.

the overlapping rectangles, the complex interconnected factors. As the political situation of the states varies, the position and size of individual rectangles may change.

A single Venn diagram in a mathematical sense shows at one particular time t_0 the magnitude of the four sets, governance (A), reconciliation (B), justice (C) and economic development (D) for a hypothetical state **{A, B, C, D}**. We can then depict the time history of the state to be the difference in the changing areas of the Venn diagram between some time t_0 and another time t_1 . Changes in the state over time then constitute differing Venn diagrams and comparisons in the political stability of one state with another are possible by comparing their diagrams. The colors of the sides of the areas indicate the numbers of factors contributing to that area. Note, even in this highly idealized case the Venn diagram shows the extreme complexity of the situation.

As large groups of people vie for themselves it becomes likely that the most disadvantaged will resort to either migration or immigration. Coastal areas inundated by salt water will require groups to migrate away from the sea and in some cases it may be most strategic for individuals and families to immigrate to other countries. For the US, Podesta and Ogden¹⁹ state the greatest burden of immigration will come from Mexico and the Caribbean. It is likely that the low-lying areas of Bangladesh will force inhabitants to move to other countries; those most likely to be impacted are China, India and Pakistan. As African Moslems migrate from drought, food scarcity and sea level rise, the European countries and the EU will have to deal with swelling numbers of people with differing social customs, differing interests, people lacking in skill sets to add value to the host countries. It becomes absolutely essential that rules of engagement for immigration be written and understood well ahead of the need for them so that the people involved do not see the response as one based upon greed and lack of justice.

Health concerns may become a problem further requiring the long term planning of those governing in the host countries. In the Middle East especially, limitation of water parallels increases in population. In Africa, health concerns, e.g. air and vector-borne diseases such as malaria and dengue fever, will present growing health and cost challenges. In the developed world countries pandemic diseases can mean revenue loss as exports decline. In some cases the government policies may be challenged by migrating groups as being discriminatory in nature.

What needs to be done?²⁰

First and foremost, the scientific and political communities need to accept the importance of the intertwined C's, climate and conflict. For the climate community climate change must be regarded and studied in a much broader context. Improved knowledge and dialogue with the potential people involved is critical. Contrary to the mitigation of climate change that is dominating the discussion today, we need to emphasize adaptation by the failing states and ethical considerations should be foremost in how this is accomplished.

¹⁹ Ibid

²⁰ Dan Smith and Janani Vivekananda, A Climate of Conflict; Understanding Conflict, November, 2007, International Alert, 44 pages.

The developed world needs to recognize the local nature of climate impacts and the local nature of planning for capacity building. The developed world needs to take its responsibilities seriously, to determine how climatic effects and climatic stresses are likely to play out. For that purpose we need to establish capacity building studies within a recognized and prestigious university framework, focusing on the role of the developed world along with continual dialog with the in situ parties involved. The university situation must involve graduate level work, and be financed for a long period of time to accomplish its mission.

In addition to graduate level programs, university research people need to help to formalize worldwide physical, social, economic and political science networks to deal with the range of problems brought about by the intertwined C's. It is vitally important that these networks be independent of local and formal governments, to involve NGOs and private money in stead of government support in order to bring the best of both worlds, the developed and the developing world, together.

For the failing states involved, development of adaptation measures should be adopted that are peace building and peace maintaining. Individual states must ensure that their planning documents and strategies crosslink with existing NGOs and other states' frameworks. Many instances can be found when "good works" turn into bad outcomes because of unexpected consequences. In those cases the strategy needs to be dynamic and flexible with local people being given as much assistance as is possible. Developing states need to be ready to encourage the private sector of the developing world to engage with their governments to insure flexibility of planning. Jobs lost in one place must quickly be replaced by jobs in another sector. Local people need to identify their state's most pressing needs and prioritize their planning strategies within adaptive and economic measures. Those steps are vital and important but more important still is the role of the developed world.

Role for the Develop World, both private and public

I believe the titans of industry of the wealth producing economies should recognize the important linkages between economics and stability around the world. No disadvantaged country should be responding alone to climate devastation. The developed world needs to recognize the nonfiscal assets that the developing world brings, bright, able bodied people willing to work and to learn, to be brought from the disadvantaged to the advantaged ranks, people to buy products, and to share in the wealth that the world has to offer. Always the developed world must keep in mind that economic linkages lead to stability in the world. Countries in business together tend not to aim guns at each other.

It would be advantageous if arranged "marriages" between (1) sovereign funds from challenged states and (2) developed world financial entities could be fostered. This could link both parties to seek the best outcomes from changes in climate. Part of that strategy requires a world economy that can handle distressed selling and buying in an ethical and fair way. No taking advantage of those less fortunate should be tolerated. The marketplace needs to adopt an ethical mantel in its dealings with the disadvantaged to ensure the best and fairest outcomes for all concerned.

Conclusions and Summary

Those involved in responding to the ravages of climate change need to determine how much risk it is wise to take and make adjustments if and when it is necessary. Having university educated decision makers as well as in situ advisors would be wise in these matters. Where possible, those in the developed world need to look for cheap “insurance” and plan for the future, not based upon the past but on the best judgments of what is likely to happen in the future. *We all need to share in the risk picture together.*

So, with sound research and recognition of the intertwined C’s problems it should be possible to organize and plan linkages to respond to new climate/conflicts. It is most important that we all, together, share in the consequences of local risks for individual states. By doing so we should be able to make the whole world a fairer and more stable place in which to live and grow.

Acknowledgements

The author gratefully acknowledges the contributions to this study by Professor Michael B. McElroy of Harvard University and Dr. Dale Tahtinen of Michigan Technological University. Principal references for this study include:

- Dan Smith and Janani Vivekananda, A climate of conflict, *International Alert*, Nov. 2007, pages 44.
- John Podesta and Peter Ogden, The security implications of climate change, *The Washington Quarterly* **31**:1, 115-138(2007).
- Lester R. Brown, *Plan B 3.0, Mobilizing to save civilization*, Norton and Co., N.Y., 2008, 398 pages.

along with more than 20 specialty papers and reports.

Published by the Forum on Public Policy

Copyright © The Forum on Public Policy. All Rights Reserved. 2008.