

An essay on global carbon budget approaches—Are we ready to deal with global climate changes now?

Qian YE (✉)

CNC-IHDP Secretariat, Beijing Normal University, Beijing 100875, China

© Higher Education Press and Springer-Verlag Berlin Heidelberg 2011

Abstract In this paper, a simple analysis is conducted for the purpose of addressing a simple but fundamental question, i.e., does the world have the capability in sciences, economics and governance to deal with the global climate change today and what should we do? By pointing out that although understanding of multidimensionality and nonlinearity of global changes from both natural and social sciences has been advanced significantly, it is extremely difficult, if not impossible, to find a single solution for global climate change because of the multi-dimensionality of social components and the non-linearity of natural elements inherent in the global climate systems.

Keywords global climate change, carbon budget, international negotiation

1 Introduction

At the end of 2009, COP 15 of UNFCCC, which attracted worldwide attention, lowered its curtain in Copenhagen, the capital of Denmark. Even though the whole world was still far from being recovered from financial crisis which is the most serious one since the Great Recession in 1920s, all governments, independent or united, declared in various occasions at home and abroad, that global climate change problem would be thoroughly solved in Copenhagen, which commonly be seen as a city full of senses of fairy tale. Impressed by promotions and propagandas made and supported by the host country and global media jointly at a world wide scale, general public around the world had great hopes to witness a new global climate agreement to be signed in Copenhagen UN climate conference to replace the Kyoto Protocol when it reaches its end in 2012. For various purposes, some non-governmental organizations even labeled this conference as “the last chance to save

human beings” and expected that would give participating national leaders some pressure.

One of the main reasons to generate such high expectation to Copenhagen is that dramatic change in the domestic politics in USA, i.e., the Democratic Party controlled congress both in senate and the House of Representatives, and once again became the leader party of USA. Meanwhile, the new US president Obama attached great importance to the climate change issues in many public situations. This gave international community a hope that, USA, which emits the most carbon dioxide emissions among developed countries but refused to sign on the Kyoto Protocol, would possibly take some actions that summon world’s enthusiasm in Copenhagen. This hope made the world obsessed to “Copenhagen fever” about climate change and drove all interest groups to attend this conference. At last, Copenhagen climate conference has become one of the highest level and the largest-scale international diplomatic activities held by UN, and the number of present countries (192), country leaders (85) and attendant people (more than 40000 including non-governmental organizations and media) have also broken the records of UN climate conferences.

However, instead of bringing a happy ending or a beautiful future, the two-week conference drew people back to the international climate negotiation in reality, with various diplomatic tricks, endless political conspiracies and finger points among different interest parties. The mutual trust between developed countries and developing countries fell to freezing point after 12-days-lasting disputation. To be more than that, not only was the international community unsatisfied for the empty agreement and commitment without any practical effect, the western media also suddenly began to have a deep doubt to the IPCC report’s conclusions and scientific dignity of its process. Voices calling for the resignation of the incumbent chairman of IPCC because of these faults have appeared. Moreover, the suddenly resignation declaration of the executive director of UNFCCC pushed the global climate change negotiations into the lowest point in the history.

Received June 5, 2011; accepted July 10, 2011

E-mail: qianye@yahoo.com

Although like many natural scientists who work on global climate change for a quite while, we held out little hope that the Copenhagen would be able to come to an effective international agreement, what happened before and after the Copenhagen conference has still made people who really concern with future sustainable development of international community worrisome.

From the beginning of UNFCCC to Copenhagen climate conference, the main task of all delegates in international climate negotiation, including natural scientists, economists, NGOs and diplomats from different countries, is to create a legally binding international rule that can answer the following three basic questions: what action should be taken to keep the stabilization of global climate; how to manage the cost of these activities; and how to produce a fair accord which can be accepted by the whole international community.

Undeniably, designed as a top-down international agreement, the global carbon budget approaches, no matter being proposed by what countries or interest groups and no matter based on what kind of preconditions, are considered as a fair solution by taking both the principle of “common but different responsibility” and different economic development stages for every country into full consideration. Though different in details, the global carbon budget approach admits that anthropogenic carbon emission is the main reason of climate change now, and developed countries should take main responsibility of reducing emissions mainly because of their large-scale GHGs emissions in past 200 years industrialization history. For developing countries, this approach gives full consideration not only about their emission rights for improving basic living conditions of people in those countries but also about their current stage of industrialization.

Ideally, as proposed in the Kyoto Protocol, to realize the emission target of stabilizing global climate, the developed countries should take immediate action by offering sufficient financial support and advanced technology to help developing countries build their capacities to deal with global climate changes, as well as taking the lead in encouraging innovation of new low carbon technology and transferring existed climate friendly technology. Unfortunately, the reality is far from what the whole world expects.

In this paper, neither the general framework nor technical details of various global carbon budget proposals are discussed. Instead, a simple analysis is conducted for the purpose of addressing a simple but fundamental question, i.e., does the world have the capability in sciences, economics and governance to deal with the global climate change today and what should we do?

2 A dilemma induced by the nonlinearity of social-ecological system

Ever since the 1980s, the topic on global change,

especially the issue of global climate change, has become a hot topic within international earth science community. Four international research plans of global changes, namely, IGBP, IHDP, WCRP and DIVERSITAS have been established one by one. From different perspectives of natural sciences and social sciences, these research plans have research foci on earth system by considering the atmosphere, hydrosphere, lithosphere and biosphere (including humans) by using an integrated approach. During the past three decades, a great deal of research works have been done to probe the dynamic mechanism of the earth system which consists of a series of complex interaction processes as a nonlinear multi-coupling system. A new discipline, so called global change science, has gradually developed and formed to targeting on the global environment changes. With joint efforts of natural scientists and social scientists, our understanding of multidimensionality and nonlinearity of global changes has been advanced significantly.

Since 1958, which was the First International Geophysical Year, great efforts have been made not only on understanding of mechanisms and natural processes of the earth system but more importantly on how and in what extent that the anthropogenic activities influence the evolution processes of the earth system. Earth science community has now reached consensus: 1) It is “very likely” that increases in man-made greenhouse gas emissions have caused most of the rise in global average temperatures since the middle of the 20th century. It is “extremely unlikely” that this warming was due to natural climate variability alone. The scopes and effects of these anthropogenic forcing has already equivalent to, if not exceeded, natural variability; 2) Extreme weather events have increased and regional climate patterns are changing. Heat waves and other weather extremes, as well as changes in atmospheric circulation patterns, storm tracks and precipitation, can now be traced back to climate change caused by human activities; 3) The earth dynamics is characterized by critical thresholds and shifts of states. The human activities could cause multiple interactions and trigger complicated chain reactions in the earth system. Accidentally changes triggered by human activity, would bring disastrous consequences (Li, 2004).

From the perspective of social sciences, changes in the global environment, especially in the climate, involves all aspects and different temporal-spatial dimension of human society. Whatever it is from any point of view: to build a new long-term international politics, financial relationship, to individual cognitive behavior, or to ensure sustainable development for the human society, and to the family planning, etc., the human society and the earth system human relying on each other are now forming a complex social-ecological system. To truly understand this system, there is a great need of alliance of experts from both natural science and social science, including the specialists from sociology, economics, psychology, politics, laws, as well

as policy makers, business decision makers and general public. Some fundamental problems being raised at Copenhagen, such as searching common grounds among international and domestic groups with different interests, defining relationship between contemporary economic development rights and future human survival rights, balancing the justice and historical responsibility, etc., are all making great challenges to current theoretic and applied social sciences. As one of positive outcomes, by using global climate change as a scapegoat, the presentation of various thoughts and actions on the Copenhagen conference really gave an excellent opportunity to test these theories.

Due to the multi-dimensionality of social components and the nonlinearity of natural elements inherent in the global climate change issue, any attempt to find a single solution for global climate change will fall into the following paradox.

If we take the global climate system as a nonlinear system, then the system must be very sensitive to initial condition. The future state of the climate system will be very sensitive to the value of carbon dioxide concentration, which is directly associated with human activities, to be chosen as the start point in climate models. It has been shown in IPCC report that the range of simulated global average temperatures based on different numerical models is very large when the carbon dioxide concentration is doubled. However, it is a bit of worrisome that all models only show uptrend of global average temperature with increasing carbon dioxide. Other global phenomena such as melting sea ice at faster rate in Arctic have not been correctly simulated which could lead to sudden changes of climate regimes. Therefore, any attempt to set a goal for emission reduction by either domestic policy or international agreement is equivalent to repudiate the strong nonlinearity which inherent in the global climate system.

The economic system is perhaps even more complex than the earth system on the nonlinearity and the complexity increases with an accelerating rate with the social, economic and technological development. Therefore, just by considering the nonlinearity of the social-ecological system, one can easily conclude that the attempt to establish an international agreement with a preset target will be hard to reach theoretically and practically. A similar view also turn up in the latest report “The Hartwell Paper : A new direction for climate policy after the crash of 2009”, organized by London school of economics and composed by the scholars from the OECD countries. “Copenhagen” has shown us the limits of what can be achieved on climate change through centralizing and hyperbolic multilateralism. Climate change—least of all the version of climate change we have chosen to construct—cannot be addressed through any single, governing, coherent and enforceable thing called “climate policy”.

3 A possible roadmap to address global climate change

An international well-known scholar, Dr. Glantz et al. (1999, 2001) pointed out that the majority of environmental problems, including global climate change issues, that we are facing share some common characteristics, i.e., these problems or changes are imperceptible from one day to the next, but over some period of time they become noticeably worse. By then, however, attempts to address them have become more difficult as well as more costly. Dr. Glantz defines this kind of environmental problem as “Creeping Environmental Problem (CEP)”. The same description can be found in the newly published Hartwell Paper (Prins et al., 2010), the global climate classically is, that there are no self-declaring indicators which tell the policy-maker when enough knowledge has been accumulated to make it sensible to move into action. Nor, it might be argued, can a policy-maker ever possess the type of knowledge—distributed, fragmented, private; and certainly not in sufficient coherence or quantity—to make accurate ‘top down’ directions”.

Copenhagen conference and the sequent “gate” events which have negative impacts on global climate change negotiation indicate that the international communities are still not capable of dealing with such kind of nonlinear and multidimensional global climate change issues. First of all, this lacking of capacity comes from the insufficient knowledge in sciences. As far as global climate change phenomena are concerned, the spatial and temporal scales involved are far beyond the current capability of scientific observing networks because of the interaction process of all natural and human factors. Therefore, making forecasting of the future must be taken great caution by clearly defining limitations of spatial and temporal scales of the predicted phenomena. In particular, the scientific assumptions should be well communicated to the media, general public and policy makers, and guarded from exaggerating as scientific conclusions by some interests groups.

Secondly, global climate change issue by nature is a creeping environmental problem. Uncertainties in sciences should not be the excuse for no action. On the contrary, it is the presence of future uncertainties that require us to take appropriate actions as soon as possible. Climate on the Earth always changes, no matter due to natural causes or human activities. In addition to understand how and in what degree climate changes, government policy makers, corporation decision makers and general public should pay highly attention to the impacts of climate changes.

Thirdly, the global change problem, especially the global climate change issue is much more complicated than current understandings of natural sciences and social sciences. The great nonlinearity is essential of the Earth’s climate system. Based on this fact, actions should be taken by applying an integrated and multi-disciplinary approach

through a flexible, adjustable and gradual process. In addition, full preparations must be taken to deal with all kinds of extreme events and sudden changes that would happen. Early warning systems of all kinds and the capacity of handling emergencies at all levels in society also need to be reinforced.

Last but not least, though global climate change is now a well-known phrase to ordinary people, it must be understood that global climate changes involve all aspects and levels of natural and social issues, including national interests, scientific knowledge, economic value, engineering technology and ethic issues. Lacking of uniform “language” among natural scientists, social scientists, politicians, diplomatists, strategists and engineers, make it hard for the experts from different disciplines to communicate on a same platform which requires dealing with the complicated social-ecological issues such as global climate change.

Looking forward to the future international corporations on global climate change issues, the author cannot agree more on Dr. Glantz’s famous concept, i.e., “the twenty-first century has a good chance of becoming the climate century”.

In the ensuing decades of the 21st century, the ability of societies around the globe to cope with climate variability, weather extremes, and the likelihood of global warming and its unknown beneficial as well as adverse effects will increasingly be tested and will likely dominate the decision-making concerns of national leaders. In this regard, it seems

that the twenty-first century has a good chance of becoming “the climate century,” a century in which climate-related concerns will occupy significant attention of the next generations of policymakers—Glantz (2003).

Acknowledgements This research was partly supported by International Cooperation Project (No. 2010DFB20880) “Integrated Risk Governance—Models and Modeling” funded by Ministry of Science and Technology of China.

References

- Glantz M H (1999). *Creeping Environmental Problems and Sustainable Development in the Aral Sea Basin*. Cambridge: Cambridge University Press, 291
- Glantz M H, Ye Q, Ge Q S (2001). China’s western region development strategy and the urgent need to address creeping environmental problems. *Arid Lands Newsletter*, 49 (5–6): 18
- Glantz M H (2003). *Climate Affairs: A Primer*. Covelo, CA: Island Press
- Li J Y (2004). Interaction between global change and human activities. Invited lecture, CNC-IGBP annual conference, Beijing, China
- Prins G, Galiana I, Green C, Grundmann R, Korhola A, Laird F, Nordhaus T, Pielke Jnr R, Rayner S, Sarewitz D, Shellenberger M, Stehr N, Tezuko H (2010). *The Hartwell Paper: A new direction for climate policy after the crash of 2009*. Institute for Science, Innovation & Society, University of Oxford; LSE Mackinder Programme, London School of Economics and Political Science, London, UK