



## A vision from the field: climate challenges in developing countries

Pedro Walpole SJ[1]

Dear President, Professor Werner Arber, and members of the Pontifical Academy of Sciences, dear Brothers and Sisters, greetings. Let me start by thanking the President of the Pontifical Council for Justice and Peace, Cardinal Turkson, for his kind invitation to take part as a speaker in this Consultation on “*Laudato Si*” and the path to COP 22” under the session of “The Scientific Community and the Environment.”

In this vision from the field I talk of things seen at present but also of what societies in Asia Pacific are seeking. I speak of four areas of change, yet all are interconnected. I will not be comprehensive but hopefully indicative of what needs to be done for the greater integrity of humanity’s response to her own and all life on this planet. The objective is to identify key challenges and contribute to strengthening relations and systems by focusing on experiences and lessons learned in the Asia Pacific region.

Home to nearly 60% of the world’s population, with over 4.5 billion people,[2] Asia Pacific also has countries with some of the youngest and oldest populations in the world.[3] The future and the challenge of this region is in a particular way in the 717 million youth (15 to 24 years old) in the region comprising 60% of the world’s youth, and those who follow them, all struggling to work with the future of which they are uncertain.

While there have been advancements in basic wellbeing (water, nutrition, health), and gender equality, the challenge is to do more and in many areas there is still limited access to education for many youth. This is critical in the transition to employment for sustainable livelihoods and for all to survive peaceably and with dignity in this world. On the other hand there are emerging contradictions of technological addiction that disables people in committing and caring for life, where as much as 30% of the population in China, Korea, and Taiwan may be experiencing “problematic Internet use.”[4] China and Japan have in-patient care with Internet fasting camps, while Australia has developed the first in-patient adolescent treatment program.

The education needed is not simply generic but where competencies are learned, strengthening a sense of relation and belonging to place, culture and life. Many youth today feel displaced or disconnected and often need a second chance, a third chance – any chance they can get so as not to be marginalized! Casual daily labor should be at most an exception in today’s developing world and decent work (SDG 8) should not be the promise of some future economy, but the focused action of the global economy today.

Urbanization is a major part of this transition for the youth and it brings with it much poverty and injustice when too hasty and segmented. Something is lost in human integrity when a people no longer know the life of the land or seas. Modern culture must not just praise the high arts but recognize the importance of the local culture and integrity of living close to the land and directly using natural resources. If globalization does not bring us closer to the wellbeing of all and the acknowledged goals of society, then it certainly does not serve humanity and humanity remains the slave of the economy.

Urbanization and technological advancement are acknowledged in the region as key towards sustainable economic growth and are aspirations to spur improved social development and environmental protection.[5]

How is this seen in the field and what are we called to bridge? Recently a friend relayed local events where a rural woman killed her four children and then committed suicide. A week later her husband killed himself. This is a very sad story of a very poor family in despair. Maximizing consumerism in society can further marginalize the economic survival of the poor and neither the hungry nor the consumer can manage the balance with the environment.

How can the poor secure daily needs and at the same time be helped to sustain the natural resources around them? How can we have full cycle production and lifestyles that care to include others without waste? That would truly be good news!

I will talk of four areas of change that hopefully contribute to this vision:

Climate change and resilience that challenge us to reduce vulnerability and to increase adaptation measures with mitigation that changes the status quo

Land use change and relations in the landscape that challenge us to increase forest cover, reduce chemical use in commercial agriculture, and improve water

quality and distribution

Food security and resource needs that challenge us to ensure that production and distribution of food is socially equitable, producing in accordance with what people need and not what the economy wants, and

Culture, livelihood and integrity that challenge us to find social integrity and a

sense of belonging in each culture and country, while livelihood ensures a quality of life that gives reason to live.

## **1. Climate change and resilience**

Typhoon Haiyan was a near perfect storm riding across the Pacific Ocean for 6 days from 3rd to 8th November 2013[6] on course for the crescent bay of Tacloban City, Leyte Island, Philippines. The scientific measurements and social realities of vulnerability and infrastructure were all known before the event,[7] but could not trigger a change in national economic planning or access to land by the poor. A storm surge of lesser dimensions had hit during the settlement's history, most recently in 1897.[8] We have built new houses and evacuation centers but we have not yet built sustainable lives, while hoping that work overseas will temper the problem. We knew what was coming but not how to act.

Typhoon Thelma 5th November 1991 nearly 22 years earlier to the day hit Ormoc City on the other side of the same island. It was an example of another climate phenomenon of greater intensity impacting on the hazards in the landscape and social vulnerability where sustained heavy rains along the direction of the river flow built up and resulted in an equally grave devastation.[9]

Knowledge is not action. "Science and technology do not impact without personal, political, and economic commitment. The focus on values helps form a broader social engagement that is gravely lacking in guiding social actions and political decisions necessary to stay within the planetary boundaries. Science can more actively support societal transformations by engaging elements of society in their concerns." [10] We are today learning to anticipate disastrous events but still not fast enough to negate the impact. Defining hazards, responsibilities and protocol is critical in learning to address the vulnerabilities to climate change and more intense typhoons, floods, droughts and sea level rise.

This describes much of what we expect of how climate change will impact in multiple forms throughout the world. The precautionary principle should now be a norm in addressing environmental concerns. Scientific proof is never 100% until it has happened, but scientific certainty (extremely likely 95%+)[11] should prevail as a point and time for comprehensive action.

Social vulnerability accounts for a major percentage of the population in Asia Pacific given the number of households at risk and their poor housing. Hazards cover a major part of the land area due to coastal events, flood, and landslide exposure, and these are the areas generally occupied by the poor. Society already knows these are high risk areas, where the rich do not live but fails to provide land that includes them within a safety net of urban development. There are the projections of more extreme events where many mitigation efforts are going to be inadequate and the challenge will be a continuous adaptation by the local people across each landscape.

As with relief and building back better in Banda Aceh, Indonesia two years after the tsunami,[12] the assessment in the Philippines reveals the need to learn a new form of governance in times of crisis.[13] The challenges on the ground of communication and social learning, governance and solidarity are evident.

### **Ten Lessons learned:**

Social vulnerability where the poor are exposed to hazards at some point results in disaster.

Understanding of the range of disaster risks is essential for better planning and response.

Adaptation of necessity must occur without first needing to be convinced by local experience of disaster.

Safe infrastructure and social preparedness must enable and empower local communities. Strengthened local capacities and broader participation in governance lead to reduced risks and greater human security.[14]

Effective emergency governance by government and other agencies - one-stop- shop with standards and accountability is desired, not the status quo of "ordinary time" government bureaucracy.

It is essential that redesign of relief continues to build better and more sustainable communities that are environmentally sustainable and socially and economically inclusive if future disaster is to be reduced.

National prioritization of problem-focused science and its communication are needed.

Social and economic inclusion is critical in reducing risk and creating resilience.

Resilience means livelihood where people can live under better economic conditions and so reduce their vulnerability and build community relationships.

And of course, switching to and sustaining low carbon national economies and lifestyles is urgent.

A carbon lifestyle feeds not only climate change but makes most of our Asian urban centers barely inhabitable with fine and sometimes noxious particulate matter. This is especially evident when industrial centers are in areas where pollution gets locked down by cold and oceanic airflows. Last December 2015, when winter had set in and polluted air was trapped, Beijing's city government issued a "red alert"[15] for smog levels. Schools and construction sites closed, traffic was restricted. Air pollution had reached 500µ/m<sup>3</sup> and in other cities in Hebei Province, the levels went beyond 1,000µ/m<sup>3</sup>.

Given these major ecological challenges in China that severely impact the socio- economic wellbeing of people, government and civil society are actively responding. The government implemented new environmental protection policies that include the Air Pollution Prevention Law and the introduction of the Soil Pollution Prevention Action Plan. Crucial milestones also include the publication of a National Catalogue of Hazardous Wastes and granting more power to the Ministry of Environmental Protection in terms of environmental management.[16]

The world economy and how we go about problems has hardly changed since the industrial age. How can we reassess globalization and the rule of competition in today's world so that daily living and the environment are factored in?

We all can recognize the consequences of short-sighted development but countries are less powerful, certainly developing countries, than those multinational corporations that seek to minimize costs of both labor and natural resources to the local detriment.

The kind of science we need is a science where people matter. Science then is not simply a problem of knowledge but of identifying problems of society and setting these as priorities of scientific investigation and communication. Great commitment is needed in doing sustainability science as a "problem-solving engagement in society and much adjustment is needed from all sectors to be able to trust and work together." [17]

## **2. Land use change and relations in the landscape**

Climate change is but one of nine planetary boundaries[18] and while all are interrelated we have to tackle each one at its source. The planet's boundaries when put on the landscape are easier for people to see where they connect and can make a contribution.[19]

Climate change, air pollution and ocean acidification are all due to the use of fossil fuels that will trigger very complex changes as we cross these boundaries. The use of fossil fuels is not a planetary boundary but a boundary of the global economy as designed, both as finite resources and the source of derailing the climate as we know it. Other driving forces beyond fossil fuels are land use change and novel entities (10,000 compounds) many of which add to the threats to agriculture and biodiversity. These three key boundaries affect the stability of all other boundaries of the planet and also the marginality and migration of the poor.

All of these boundaries, within which the human population needs to live, along with the social needs of all its members constitute the challenge of today's world.

We have seen this in Asia for example with the expansion of oil palm plantations in Indonesia and Malaysia that is a major driver in both countries' worsening case of deforestation. These two countries account for 85% of global palm oil exports.[20] However, due to the subsequent adverse impacts of these unsustainable land use practices to the productivity of the soil (desertification), the biodiversity of the land and ultimately, the threat on food security, an ADBI working paper reported that "it has become increasingly apparent throughout the region that the long-term ecological and socio-economic costs from unsustainable land-use ultimately overwhelm the more immediate gains." [21]

Indonesia has grave forest fires. Land use activities intended for logging and agriculture are carried out by means of fire because this is the easiest and cheapest method available.[22] Fire clearing in Indonesia frequently occurs in the country's expansive tropical peat lands; peat is organically (carbon) rich and highly combustible.[23] Therefore, fire clearing, combined with the accompanying practice of draining swampy peat land, causes the land itself to burn. This further results in Transboundary Haze Pollution (THP) as smoke is transported by monsoonal winds over to Malaysia and Singapore in particular. Both the loss of such carbon sinks and release of carbon to the atmosphere are of global concern in addressing climate change.

Indonesia has begun anew to seek greater inclusion of community life in forest management. The country's Constitutional Court annulled the government's ownership of customary forest areas and ruled that "members of customary societies have the right to [...] use the land to fulfill their personal and family needs." President Joko Widodo supports the integration of forest resource maps of 32,000 villages into state maps. The ruling could eventually lead to the resumption of community control over around 40 million hectares of forest lands.

That is more than one-fifth of the land area of one of the world's largest and most populous countries.[24] The Indonesian government has stepped up efforts to prosecute companies and individuals who set fires and also strengthened its fire-fighting response.[25]

Policies and strengthening of the legal framework are essential in addressing national ownership of the problems and control of international corporate abuses. Another example is the legal action taken in China over toxic liquids dumped in the Tengger desert, an oil spill in Bohai Bay and emission violations of imported vehicles. This has been the work of the China Biodiversity Conservation and Green Development Foundation, a non-profit organization made possible by a new environmental law that took effect in 2015, allowing public interest litigation by registered environmental organizations.[26]

### **3. Food security and resource needs**

Two-thirds of the nearly one billion hungry people in the world live in Asia Pacific. Social development has not kept pace with the rapid economic growth, and there are “two faces of Asia – one of progress and prosperity, the other of continued poverty.”[27] Undernourishment has decreased in Asia and the Pacific in the past two decades, from 739 million to 564 million, but the challenge remains grave.

Rising incomes and affluence with increasing populations continue to drive greater demand for more protein-rich food due to shifting dietary patterns and better nutrition, with enormous implications in food production. Food consumption in the region grew from 2,379 kilocalories per capita per day in 1990 to 2,665 in 2009, but for some it grew much more! (The minimum caloric intake for women is 1,200 calories per day and 1,800 for men). There are 733 million people living in absolute poverty (living on less than US\$ 1.25 a day) and 537 million who are undernourished, more than the total in Africa.[28]

Food security in the region is affected by rising food prices especially staples such as rice and wheat and the impact is greater on the poor who allocate 50-70% of their budget to food. And with 60% of the population relying on local agriculture and food production, climate change is a major challenge to food security.[29]

By 2030, we are expected to face a 35% increase in global food demand.[30] The improvement of agricultural productivity and increase of sustainable food production processes will largely rest upon the actions of governments and other key sectors in terms of how they empower and invest on the small scale farmers and place them at the center of development strategies.

Furthermore, we need a deeper discussion on the problem of unequal distribution of resources as a future with food sustainability included in the picture will entail much-needed change in attitude and actions we presently have over food supply and its distribution. The world produces enough food if people did not waste it and use so intensively as animal feeds. There is also the extensive use of chemicals not only in production, but also in the large-scale commodification of food. Extending the shelf life of a product as against basic fresh food does increase the profit margin but does not always meet the need.

Current food production and distribution systems are failing to feed the world. Agriculture produces enough for 12-14 billion people, enough even for the projected 2050 population and still, 1 in 8 of the world's population are chronically hungry.[31] The cause of hunger therefore, is not lack of food, but lack of access, the inability to buy.

With increasing urbanization such as in China where its acceleration is a national priority, maintaining food security will be an accompanying priority in the region as arable land becomes scarce, apart from rehabilitating heavily contaminated land and restoring aquifers. Most land is now under cultivation and given the different sustainability factors called for there is little expansion possible.

Farmers are also aging (in the Philippines, the average age of a farmer is 57 years old) and rural youth are increasingly uninterested to work in agriculture, whether on the land or to study agricultural sciences not least because of the hard labor involved and the risks resulting in insecurity.

### **4. Culture, livelihood and integrity**

China has adopted forestry-based programs to improve environmental conditions and reduce rural poverty, with relative success in increasing forest cover and rural household income. The experiences of communities in the counties of Ningshan, Anhua, and Ledu illustrate the impact of collective forest tenure reform, allocation of economic forest areas, and the conversion of croplands to forests program in improving income and employment while ensuring levels of environmental protection.[32]

In the modern age of medicine, it is hard to understand the figures of 65-80% of the population relying on medicines derived from forests as their primary health care.[33] Yet the Yao people living across the mountains of South and South Western China, or Dzao in the mountains of Vietnam, Laos, Thailand and Myanmar are one of the foundations of Chinese medicine today. They have traveled in the high mountains for a thousand years and depend upon the plants of the region studying their properties.

Some have settled on the forested slopes of the Ba Vi Mountain, Vietnam where they practiced shifting cultivation. In 1886, French botanist Benedict Balansa identified 5,000 species of flora around Ba Vi, obviously using the local knowledge to do this, and 350 of which have been identified as being of particular use to humankind. Sadly, 100 years later, the number of species present is estimated to have fallen to 2,000. Similarly, the management of Ba Vi has drastically changed. In the early 20th century, forest on the lowland plains surrounding the mountain was cleared for agriculture and settlements by logging operations.[34] The communities in the area as in many areas have grown at the same time and there is a reduction in the forest land available, so other forms of adaptation are necessary while sustaining the growth in cultural knowledge and relation with the land.

After the declaration of Ba Vi Park and under new laws, forest land is being transferred to groups and individuals through a system of leases. On land designated as forest, lessees are required to grow tree species specified by Park Management.

Residents have expressed concern especially when eucalyptus is planted in agroforestry systems as it can reduce soil fertility, lower the water table, and encourage new agricultural pest species. Dzao communities want to establish a medicinal plant collection and cultivation zone within Ba Vi Park in collaboration with Park Administration and local NGOs to monitor land use to avoid unsustainable harvest practices.[35]

Cultures are living relations, not simply preserved of ways of the past and so there is a need to adapt. Some of the Pulangiye youth who live on the land of their ancestors in Mindanao, Philippines are making a new path. The youth like motorbikes, use cellphones and computers; there is much they like about the modern world. Yet they learned from their parents and community how the forests use to be before the logging companies came. They know the crops their parents used to grow and grow no more. They plant rubber, have a little corn, sweet potato and ginger, but they want to spend their time growing trees on the steeper land and protecting the spring sources of the community.

They have identified, from within the culture's knowledge, 20 different species that form the structure of the natural forest. They have also identified 38 other species that help assist in this forest regeneration, along with 18 species that inhibit its regeneration. They work with seven varieties of banana and nine varieties of abaca and their knowledge of the biodiversity would only be known by a few specialized botanists. One of them teaches this knowledge to the youth in the culture-based high school though he has no formal qualification to teach. But if there is a forest kept in this community and in neighboring communities, it will be because of the teams of youth that have been trained in this community.

#### **Some points worth considering:**

- Indigenous peoples need not simply be laborers on their ancestors' land but dignified communities contributing to the richness and sustainability of society.
- Given the land pressures, many indigenous cultures cannot continue to practice an extensive agriculture within the forest area now much reduced, and they need a fair pricing for their crop production.
- The role of indigenous communities in forest management needs to be integral to their practices and can be shared more widely if their contribution to ecological services is respected.
- Indigenous communities, being unique in culture and bio-diverse landscape management, are not merely tourist destinations and living museums but critical learning experiences for our urban and academic communities.

National economies don't have to push people to the extreme and marginalize local cultures. With all the technological advancement, society can meet such cultures in a sustained and sustainable manner, valuing especially the role they can play in ecological services when supported.

We need the basic context of a community to dare to envision the world by:

- Promoting values and principles that the community can live by
- Addressing youth insecurity and social vulnerability
- Being free from fear and seeking peace
- Seeking greater sustainability in all practices
- Inviting others to share and being gender sensitive

- Calling for deeper listening and response

Given such a context, communities strive to be connected and be attuned with their environment and in some ways lower their impacts without lowering their quality of life. When communities are accompanied, their vision for their self, family, community, nation, and the world is broadened and allows them to heal the landscape and work through a community of networks. The Holy Father speaks simply and clearly of this (*LS 219*).

Nurturing a community of practice for reconciling with creation can help us more effectively network for justice. If we collaborate, the impact of our actions are broader and we gain more understanding, and even though they maybe small actions, they connect with the global. Learnings are greater when we participate in joint action.

## 5. Summary

Where are we locally? The Philippines, China, Taiwan, Japan and Vietnam make up the typhoon zone. The Marshall Islands and other atolls face sea level rise. Indonesia has grave severe forest fires and land conversion as do other countries. Air pollution is a problem of most of our urban and industrial centers, and in China, food, and land and water degradation are critical concerns affecting the daily struggle of many, as in most of the surrounding countries. The loss of ecosystem functioning and biodiversity at the local level is devastating for many communities and threatens to accumulate globally.

After looking at just the four areas of climate, landscape, food, and culture, with more than half of the planet's population and capacity in the region, many of the most vulnerable populations of the poor are rural. While they hold a certain flexibility to subsist, they cannot be stretched anymore and the environments where they live are again most vulnerable. Similarly for urban poor populations the social and economic inclusion is urgent.

I have four main points that partly summarize what I have shared:

### a. What's the vision?

Looking for a greater connectivity, governments are becoming more aware of their responsibility for the condition of the vast majority of their people who are poor and this is impinging on national level discussions of economic growth, knowing that the trickle-down does not work.

Some rural focused actions that might be crucial are:

- Provision of credit, trade, market, and production support to animate and revitalize local economies, and not just the economy of consumption
- Provision of insurance in cases of flood, drought, and loss of harvest
- Further support and inclusion of farmers in more resourceful management of environmental concerns
- Reduction of waste in food production and regulation of animal feeds
- Regeneration not only of forests but also soils and water resources
- Support for more organic food production
- Control of chemical use in commercial agriculture
- Avoid the temptation of quick fixes
- Use of the precautionary principle in terms of commercial food production and expansion
- Youth education focused on leadership in service not just excellence
- Education on the social and environmental roles of people.

### b. Scenario planning and 'what if'

Many societies are still running under the status quo, which is part of the reason for many poor countries being increasingly determined by corporate investment. An aspect of the problem is when a nation believes in the regulating power of the market, global resource sufficiency and centralized control, but when a disaster hits there is poor capacity and weak critically response. We need today a language in government not of environmental crisis or denial, but of scenario planning, adaptive management, diversity, resilience and the

acceptance of uncertainty and of uncontrollability. The key words are no longer efficiency and maximum yield, rather key words are sustainability, human development, biosphere integrity and scenario planning.

This means that a science agenda is set nationally through policy decisions on what needs to be studied and researched in national universities as a result of national priorities with international support where acceptable. We need to integrate the Planetary Boundaries with the economic, social and environmental domains of global thrusts.

We still lack institutional and social commitment to the fundamental changes in a carbon economy. Yet we must continue to act on these concerns from within countries. We need to review the inner struggle in terms of scientific, environmental, socio-economic and political factors. How are people able to respond locally and what can we learn from them? The relationship between solidarity, adaptation and the youth needs further understanding as humility and personal effort are there and can be further guided and coordinated.

All of society, all professions, workers rich and poor, youth and children need a deeper and more community sense of social and environmental roles forming “communities of practice” where possible.

### **c. Value of the COP process**

The COP process is valuable because it recognizes and works from the risk and disaster events we’re exposed to. Where we are in Asia Pacific, the events are typhoons and sustained rains, drought and extreme temperatures, and short and long-term sea level changes short and long term already affecting coastal towns and cities. Some of these places are the small island states, mostly tropical islands, composed initially of the atolls but others will follow in the Pacific. Certainly the aridity, the droughts and water shortages of Africa are way beyond our experience, yet Asia’s poverty is deep and even gains made can be lost if measures do not keep pace with climate change.

We probably recognize with Driss El Yazami, President of the National Human Rights Council of Morocco and Head of Civil Society activities during the COP22 in Marrakech in November, the crucial and basic elements of COP22 and the problems and needs of Africa.[36] He highlights the role of international civil society and how it can contribute.

There is quite a focus on business and technology and this too needs to be according to the priorities and capacity of the continent. The Marrakech gathering allows greater focus on the concerns rather than the philosophical and scientific debates. It will continue to open up the environmental discussion with greater recognition of the cultural and spiritual realm. It raises questions of responsibility and seeks to address the moral concerns of those in need. It is in this deeper sense of humanity that Driss El Yazami calls for the “universalism” that enables all to act together “even if the historic responsibilities and future effects are not equally shared.”[37]

While the world’s economic activity is measured in GDP, we are now measuring risk as the outcome of social vulnerability, exposure to hazards in degrading landscapes, and increasing climatic events and their severity. Somewhere climate and GDP must meet without being a further disaster.

### **d. The compassion and practice of *Laudato si’***

The Holy Father cautioned about the plundering of Earth’s resources because of shortsighted approaches to economy, commerce and production.[38] With this, he also called for the redefining of our notion of progress. Economic growth that leaves in its wake a deteriorated environment, depleted resources and low quality food, diminishes the quality of life of many people around the globe, and further exacerbates the exclusion of the vulnerable and marginalized.[39]

At the global level the release of *Laudato si’* placed the environment and the poor at the center of climate change and sustainable development discussions. There are countries where government and people don’t know or see the point of the Holy Father’s involvement in the matter, but as members of the UN, they may note the reference of UN officials to the encyclical. In the Catholic world and its communities in Asia Pacific, where if it is translated and shared it is an experience of deep compassion for the poor that someone shares their pain and suffering! There is generally a broad acceptance and reception of the encyclical, although the transmission to local parishes, communities, church-based organizations for translation to local action may not be as extensive.

Where *Laudato si’* is deeply received are with groups working on environmental and social concerns, as the Holy Father affirms the work being done by many for years, and provides a fresh infusion of energy for action in what seems to be a hopeless and deteriorating world of non participation. For many the document was an

absolution for all the work done, that those taking action have not wasted their time, talent and friendships in an effort to care for creation so often previously dismissed as on the one hand marginal or the other extremist.

To reconcile our role in the care for the Creation, we speak of conversion or change of heart. The ecological conversion needed to bring about lasting change is also a community conversion to a new way of practicing change together. First, it entails gratitude and recognition that the world is gift.[40]

## References

- [1] Environmental Science for Social Change, Jesuit Conference Asia Pacific. Email: pedrowalpole@essc.org.ph. I thank the team of Sylvia Miclat, Maricel de Jesus and Amor Paredes for their help in preparing this paper.
- [2] UNESCAP December 2015. [online] URL: <http://www.unescap.org/our-work/social-development/population-dynamics/about>
- [3] UNDP, "Shaping the Future: How Changing Demographics can power Human Development," Asia-Pacific Human Development Report 2016.
- [4] Center for Internet Addiction, FAQs. [online] URL: <http://netaddiction.com/faqs/>
- [5] Ningbo Initiative, June 2016, Asia-Pacific Economic Cooperation, Ningbo Initiative, June 2016. [online] URL: [http://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Urbanization/2016\\_ningbo.aspx](http://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Urbanization/2016_ningbo.aspx)
- [6] Hong Kong Observatory. Review of Tropical Cyclones in 2013. [online] URL: <http://www.hko.gov.hk/publica/tc/tc2013/english/section2.htm>
- [7] Fisher, M. "47 statistics that explain Typhoon Haiyan," Washington Post, 21 November 2013. [online] URL: <https://www.washingtonpost.com/news/worldviews/wp/2013/11/12/47-statistics-that-explain-typhoon-haiyan/>
- [8] Lotilla, R. (citing Jose Algue, SJ, Director of El Observatorio de Manila and who published a 136-page monograph entitled *El Bagueio de Samar y Leyte* 12-13 de Octubre de 1897) "Flashback: 1897, Leyte and a strong typhoon," Rappler, 20 November 2013, updated 10 July 2014. [online] URL: <http://www.rappler.com/move-ph/issues/disasters/typhoon-yolanda/44062-leyte-1897-typhoon>
- [9] Environmental Science for Social Change. The Ormoc City Tragedy of November 5, 1991: An evaluation of the different contributing factors (Environmental Research Division, Manila Observatory, October 1992). [online] URL: <http://essc.org.ph/content/view/264/46/>
- [10] Walpole, P. What does a sustainability science look like, how can it operate? Submitted June 2016 to *La Civiltà Cattolica*.
- [11] IPCC, 2013: Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- [12] Prasetyo, H. Lessons from Post-Disaster Recovery: Rehabilitation and Reconstruction of Aceh and Nias. Regional Knowledge Forum on Post-Disaster Recovery, Asian Development Bank, 20-21 October 2015.
- [13] Balisacan, A. Keynote: Lessons Being Learnt from Typhoon Yolanda Post-Disaster Recovery in the Philippines. Regional Knowledge Forum on Post-Disaster Recovery, Asian Development Bank, 20-21 October 2015.
- [14] Philippine Working Group on Disaster Risk Resilience. "Contributing to a global post-2015 disaster risk reduction framework," Ecojesuit, 28 February 2015. [online] URL: <http://www.ecojesuit.com/contributing-to-a-global-post-2015-disaster-risk-reduction-framework/7687/>
- [15] World Air Quality Index. Beijing Air Pollution: Real-time Air Quality Index. [online] URL: <http://aqicn.org/city/beijing/>
- [16] Ministry of Environmental Protection, People's Republic of China. [online] URL: <http://english.mep.gov.cn/Resources/laws/>
- [17] Walpole, P. "What does a sustainability science look like, how can it operate?" Submitted June 2016 to *La Civiltà Cattolica*.
- [18] Rockström, J., W. Steffen, K. Noone, Å. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. Schellnhuber, B. Nykvist, C. A. De Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley. 2009. Planetary boundaries: exploring the safe operating



- space for humanity. *Ecology and Society* **14**(2): 32. [online] URL: <http://www.ecologyandsociety.org/vol14/iss2/art32/>
- [19] ESSC. Boundaries in the Landscape: shattering relations reduces resilience. [online] URL: <http://www.ecoesuit.com/gian-ecology/>
- [20] Rainforest Action Network (citing the Malaysian Palm Oil Council, 6 November 2008). Palm Oil Fact Sheet. [online] URL: [http://www.ran.org/palm\\_oil\\_fact\\_sheet](http://www.ran.org/palm_oil_fact_sheet)
- [21] Howes, S. and Wyrwoll, P. 2012. Asia's Wicked Environmental Problems. ADBI Working Paper 348. Tokyo: Asian Development Bank Institute.
- [22] Tacconi, L., Jotzo, F. and R.Q. Grafton 2008. "Local causes, regional co-operation and global financing for environmental problems: the case of Southeast Asian Haze pollution," Economics and Environment Networking Papers 0613, Australian National University, Economics and Environment Network.
- [23] Howes, S. and Wyrwoll, P. 2012. Asia's Wicked Environmental Problems. ADBI Working Paper 348. Tokyo: Asian Development Bank Institute.
- [24] Pearce, F. "Fred A Global Call to Action on Indigenous and Community Land Rights," 2016. Oxfam International, International Land Coalition and Rights and Resources Initiative. 2016.
- [25] Minnemeyer, S., Sargent, S., Tabor, K., and Soter, G. (July 2016. "). As Indonesia's Dry Season Looms, a New Tool Can Predict Daily Forest Fire Risk," World Resources Institute, 7 July. Retrieved September 20, 2016. [online] URL: from <http://www.wri.org/blog/2016/07/indonesia%E2%80%99s-dry-season-looms-new-tool-can-predict-daily-forest-fire-risk>
- [26] China Biodiversity Conservation and Green Development Foundation. [online] URL: <http://www.cbcbgdf.org> and <https://www.unglobalcompact.org/what-is-gc/participants/59571-China-Biodiversity-Conservation-and-Green-Development-Foundation>
- [27] Asian Development Bank. 2013. Food Security in Asia and the Pacific.
- [28] Ibid.
- [29] Ibid.
- [30] FAO. 2014. "Family Farmers" Infographic.
- [31] 2016 World Hunger and Poverty Facts and Statistics.
- [32] Guancui, D., Sheng, Z., Caiyun, W., and Yang, L. "Assessment of the contribution of forestry to poverty alleviation in the People's Republic of China," in Making forestry work for the poor: Assessment of the contribution of forestry to poverty alleviation in Asia and the Pacific. Food and Agriculture Organization of the United Nations, Asia Forest Network, Asia-Pacific Network for Sustainable Forest Management and Rehabilitation: Bangkok, 2012.
- [33] World Health Organization. Traditional Medicine, 2003.
- [34] Asia Forest Network. "Stewards of Vietnam's Upland Forests," Research Network Report. Asia Forestry Network, Manila: January 1998.
- [35] Ibid.
- [36] "Driss El Yazami, COP 22 Head of Civil Society discusses mission to meet African civil society".
- [37] "COP22 in Marrakech: The COP of Action" [online] URL: <https://www.youtube.com/watch?v=DFtJyCipcZA>
- [38] *Laudato si'*, 32.
- [39] *Laudato si'*, 194.
- [40] *Laudato si'*, 219-220.