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South Asia regional position paper on Horizon 2020 societal challenges

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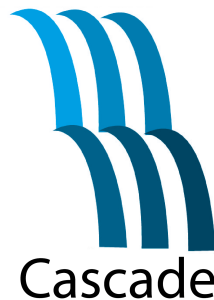
HORIZON 2020

South Asia regional position paper on Horizon 2020 societal challenges

Editors

Professor Richard Haigh, Global Disaster Resilience Centre, University of Huddersfield, UK
Professor Dilanthi Amaratunga, Global Disaster Resilience Centre, University of Huddersfield, UK
Dr Champika Liyanage, University of Central Lancashire, UK
Dr Kanchana Ginige, Global Disaster Resilience Centre, University of Huddersfield, UK
N.M.S.I. Arambepola, Asian Disaster Preparedness Center, Thailand
Dr Rishiraj Dutta, Asian Disaster Preparedness Center, Thailand





Regional position paper on Horizon 2020 societal challenges

South Asia

Editors

Professor Richard Haigh, Global Disaster Resilience Centre, University of Huddersfield, UK
Professor Dilanthi Amaratunga, Global Disaster Resilience Centre, University of Huddersfield, UK
Dr Champika Liyanage, University of Central Lancashire, UK
Dr Kanchana Ginige, Global Disaster Resilience Centre, University of Huddersfield, UK
N.M.S.I. Arambepola, Asian Disaster Preparedness Center, Thailand
Dr Rishiraj Dutta, Asian Disaster Preparedness Center, Thailand

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		Avindra Shivantha
		N.M.S.I. Arambepola
Thailand	Asian Disaster Preparedness Center	Dr Rishiraj Dutta
United Kingdom	University of Central Lancashire	Dr Champika Liyanage
United Kingdom	University of Huddersfield	Professor Dilanthi Amaratunga
		Professor Richard Haigh
		Dr Kanchana Ginige

Further information

Professor Dilanthi Amaratunga, CASCADE Project, Global Disaster Resilience Centre, University of Huddersfield, Queen Street Building, Huddersfield, HD1 3DH, United Kingdom. W: www.cascade-inconet.eu E: d.amaratunga@hud.ac.uk.

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1. Executive Summary

1.1. Background

This position paper is a summary of the South Asian region's status and interests concerning the seven thematic societal challenges identified under the EU's Horizon 2020 research programme: Health, demographic change and wellbeing; Food security, sustainable agricultures, marine and maritime research and the bio-based economy; Clean and efficient energy; Smart, green and integrated transport; Climate action, resource efficiency and raw materials; A changing world - inclusive, innovative and reflective societies; and, Secure societies - protecting freedom and security of the country and its citizens.

This paper considers the position of seven countries in South Asia: Afghanistan; Bangladesh; Bhutan; Maldives; Nepal; Pakistan; and, Sri Lanka¹. It also identifies national and regional priorities for the seven themes under consideration.

This paper is an output of the CASCADE project (Collaborative Action towards Societal Challenges through Awareness, Development, and Education) that aims to provide the foundation for a future International Cooperation Network programme targeting South Asian Countries, which will promote bi-regional coordination of Science & Technology cooperation.

The EU recognise a need to strengthen internationalisation through strategic policy action. The need for linkages with Asian countries has been highlighted given the region's rapidly growing research and innovation capacities and the urgency to address global challenges.

The project coincides with the launch of Horizon 2020, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Running from 2014 to 2020 with a budget of just over €80 billion, the EU's new programme for research and innovation is part of the drive to tackle global societal challenges, and create new growth and jobs. International cooperation in research and innovation is an essential element for meeting the objectives of Europe 2020. Recognising the global nature of producing and using knowledge, Horizon 2020 builds on the success of international cooperation in previous framework programmes and is fully open to participation from third countries.

The 18 month CASCADE project is led by Professors Dilanthi Amaratunga & Richard Haigh from the University of Huddersfield, UK but targets and has the participation of all seven South Asian countries specified in the call: Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka. The project set out to:

1. Compile a regional position paper that identifies global challenges and research priorities
2. Map and develop an inventory of national and regional stakeholders related to global challenges
3. Raise awareness on research & innovation priorities for fostering cooperation and towards building mutual understanding on how to address common global societal challenges

1.2. Methodology

This regional paper draws upon the findings of seven national positions developed for Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka. In doing so, it provides a regional perspective on global societal challenges of mutual interest to the EU and South Asian region.

Although each national paper was developed and written by a local in-country team, data collection and analysis was coordinated to ensure consistency. This was achieved through a series of briefing and training events, as well as the issuing of standard protocols and templates. The methodology was carried out in two phases. Phase 1 consisted of a detailed policy analysis and Phase 2 used a combination of semi-structured interviews and focus groups. 348 interviews were conducted across the seven countries, and a further 139 respondents participated in sixteen focus groups.

1.3. Regional priorities and opportunities for EU-South Asia collaboration in research and innovation

Health, demographic change and wellbeing

- **Poor health indicators:** Low life expectancy and high rates of malnutrition, infant mortality, and incidence of tuberculosis (TB) and HIV/AIDS, as well as widespread malaria are some of the major health challenges facing the region. Exchange of science and technology in the health sector is considered a key area of mutual collaboration. The transfer of knowledge will help South Asian countries to adopt new technologies, used for diagnosis, which can help in the early mitigation of diseases and by taking early steps through preventive measures. Priority areas for mutual collaboration with the EU in the health sector include devising integrated health policies, developing physical and technological infrastructure for health care services and delivery, designing and practicing state-of-the-art surveillance systems to detect outbreaks of diseases treat early in time (e.g. cango virus, dengue fever, bird flue), and designing cost-effective and efficient vaccines for prevention of diseases (e.g. hepatitis, TB, malaria, polio, rabies, measles).
- **Reducing the burden of NCDs:** Lower-income countries generally have lower capacity for the prevention and control of NCDs. To lessen the impact of NCDs on individuals and society, a comprehensive approach is needed that requires all sectors, including health, finance, foreign affairs, education, agriculture, planning and others, to work together to reduce the risks associated with NCDs, as well as promote the interventions to prevent and control them. There is an urgent need to lessen the risk factors associated with these diseases. Low-cost solutions exist to reduce the common modifiable risk factors (mainly tobacco use, unhealthy diet and physical inactivity, and the harmful use of alcohol) and map the epidemic of NCDs and their risk factors. Other ways to reduce NCDs are high impact, essential NCD interventions that can be delivered through a primary health-care approach to strengthen early detection and timely treatment. The creation of healthy public policies that promote NCD prevention and control, and reorienting health systems to address the needs of people with such diseases, are also priorities.
- **Financing healthcare and affordability:** Most countries in South Asia need to give more people access to affordable, quality health care. Too many people, especially women, cannot get the medical treatment they need due to high costs, difficulties in getting permission to see a doctor or a lack of health care providers in rural areas. There is a need for capacity building for health personnel, disease awareness and prevention.
- **Addressing the care and well being of the ageing population:** South Asia faces significant challenges in dealing with how future economic growth rates respond to the aging of the work force and the ultimate slowing in its growth. The region will need to ensure their social insurance systems are well adapted to confront the issues posed by an ageing population, and that the medical systems and social insurance are able to cope with the requirements of rising longevity, including the associated costs.

Food security, sustainable agricultures, marine and maritime research and the bio-based economy

- **New and climate resistant crops and varieties (e.g., high yield varieties) and technologies to increase productivity and sustainability:** The health and well-being of the world's growing population are largely dependent on the ability of the agricultural industry to raise high yielding and climate resistant food crops. Inclusive growth provides opportunities for those with meagre assets and skills, and improves the livelihoods and incomes of the poor, especially in agriculture. It is therefore among the most effective tools for fighting hunger and food insecurity, and for attaining sustainable progress. Enhancing the productivity of resources held by smallholder family farmers, fishing and forest communities, and promoting their rural economic integration through well-functioning markets, are also essential elements of inclusive growth. Technology and knowledge transfers can also help in achieving increased productivity and quality standards (particularly in relation to packaging and transportation) of agricultural and fish produce. This would, in turn, aid in the creation of new international markets for local produce.
- **Protecting agricultural lands:** A large proportion of South Asian land area is in agricultural use. How this important natural resource is used is vital to sustainable development. This includes taking the right decisions about protecting it from inappropriate development.

- **Improve farmers' quality of life and livelihood security:** Improving the quality of life of farmers and fishermen will be important to sustain agriculture and redress the rural to urban migration. Improving the productivity of resources held by family farmers and smallholders is, in most cases, an essential element of inclusive growth and has broad implications for the livelihoods of the rural poor and for the rural economy in general. Well-functioning markets for food, inputs and labour can help to integrate family farmers and smallholders in the rural economy and enable the rural poor to diversify their livelihoods, which is critical for managing risk, and reducing hunger and malnutrition.
- **Use of bio-technology in marine and fisheries to exploit sea based resources:** Marine biotechnology is essential to satisfy the growing demand for healthy products from fisheries and aquaculture in a sustainable way. The growing demand for marine food will need to be increasingly delivered through intensive aquaculture. Marine biotechnology has the potential to contribute significantly to increasing production efficiency and product quality, to the introduction of new species for intensive cultivation and to the development of sustainable practices in South Asia.

Clean and efficient energy

- **Harness hydro, wind, solar, biomass and other renewables:** Achieving ambitious deep cuts in emissions and accelerating green growth will require the development and diffusion of carbon-efficient technologies. South Asia has great potential for energy efficiency and renewable energy, including hydro, geothermal, wind, solar and tidal energy.
- **Conservation and efficiency improvements through smart national power grid, including transmission and distribution:** Innovative finance mechanisms and policies are needed to reduce the risks perceived by mainstream lending institutions in cleaner technology investments and to enhance their capacity to finance low-carbon technologies and resource options. Extensive research activities on energy consumption and the efficient use of energy is required, including exchange of science knowledge on the use of smart technologies used in the energy sector for improving efficiency and security, and introducing environmentally friendly technologies for producing energy.
- **Regional cooperation in knowledge sharing, energy development and trade:** There is a need to understand the national energy policies and resource endowments of these countries in order to identify common features and complementarities necessary for a viable regional energy security framework. South Asian countries need enhanced regional energy transfer to leverage economies of scale through a more vibrant intra and inter regional energy trade structure. Key issues faced in energy sector cooperation are centered on the need to develop a regional power market, energy supply availability, energy trade infrastructure, and harmonised legal and regulatory frameworks.

Smart, green and integrated transport

- **Environmentally friendly, green transport:** Given the rapid rise in vehicular traffic, a trend that is likely to continue due to population and economic growth, affordable, green private and public transport will be essential to control emissions.
- **Introduce / improve 'smart' traffic management:** With limited financial capacity to expand transport infrastructure, intelligent use of existing capacity will be vital to support growth.
- **Integrated transport:** An integrated and efficient transport network is an essential element of the enabling environment for a globalised economy. Effective integration of the transport system in South Asia could also contribute greatly in enhancing access to remote areas, thereby extending economic development.
- **Improved safety standards for all transport infrastructure and services:** Establish missing safety regulations, supported by strict enforcement and policing. Create awareness among people about road safety and also help developing countries to attract investment from multilateral institutions to improve their accident-prone highways. Priorities also include awareness programmes to influence the behaviour of road users, and improving care and rehabilitation following accidents.

Climate action, resource efficiency and raw materials

- **Integration of climate change adaptation within national policies and planning:** This may include appropriate land-use planning, conservation and biodiversity, community empowerment, and investing in innovative, adaptive and absorptive capacity building activities.
- **Early warning, preparedness and mitigation towards increased resilience:** Shift development towards a mindset of resilience and innovation. Much of South Asia is economically poor, socially and politically marginalised and otherwise vulnerable. Resilience building measures must be inclusive. Research activities are needed on the rapid increase of global warming and air pollution in the southern Asian region, encouraging low carbon growth through the use of new technologies, introducing cost-effective and innovative climate change adaptation methodologies, developing disaster management systems through early warning systems, the efficient use of material, waste management and recycling, and encouraging environmentally friendly innovations in the new private sector.
- **Promote the green and blue economy, develop climate resistant crops and promote economically viable ecosystems and services:** Economic diversification is not the key response needed. What is needed is for all sectors of the economy to be prepared to withstand climate change. In agriculture, for example, new technologies such as rice cultivation systems with more efficient water and nutrient use should be promoted. Altering planting times, using resistant varieties, and diversifying crops can help.
- **Management of resources and development of pollution standards and compliance:** Countries need to look at better management of resources and services. Better coastal zone management, efforts to protect riverbanks from erosion and building climate-proofed roads, bridges and other infrastructure is needed. In the water sector, groundwater should be protected.

A changing world: inclusive, innovative and reflective societies

- **Improve transparency and accountability towards good governance:** Good governance depends on an ability to exercise power, and to make good decisions over time, across a spectrum of economic, social, environmental and other areas. This is linked with the government's capacity for knowledge, mediation, resource allocation, implementation and maintenance of key relationships. Key factors for the development of better governance and transparency in South Asia include: technical and managerial competence; organisational capacity, reliability, predictability and the rule of law; accountability; transparency and open information systems; participation.
- **Greater inclusivity and improved social harmonisation among diverse populations:** This includes participation of women and youth, and consideration of the vulnerable, internationalisation, and employment. Labour market policies are also in need of reform. There is a need to move from protecting "jobs" to protecting "workers". Public works in countries like Bangladesh have been around for decades, but have lacked an explicit youth component. Employment programmes can directly produce jobs, in addition to spreading good labour practices and growing markets. Social protection for first-time job seekers, including unemployment assistance and employment guarantee schemes are also needed to protect the most vulnerable.
- **Cooperation in education system reform:** This may include introducing modern teaching technologies, updating curricula and education system management, and strengthening relationships with foreign universities to exchange lecturers and students. It may also involve conducting studies on how to strengthen commercial connections to regional and global economies, and research activities to gather accurate data on the labour market to provide research- and evidence-based policies, and strengthen the governance system.

Secure societies: protecting freedom and security of the country and its citizens

- **Disaster risk reduction, including related information systems:** In accordance with the new Sendai Framework (2015-2030), there is a need for South Asia to 'prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience'. Priorities include a shift from disaster loss to disaster risk, and from disaster management to disaster risk management. A focus on a people-centred preventive approach to risk reduction will be vital, as will defining the primary responsibility of States for risk reduction, but also shared responsibility with stakeholders. The scope of such measures must include slow-onset, man-made and biohazards.
- **Border security, crime, and surveillance:** Fighting crime and terrorism will require new technologies and capabilities for fighting and preventing crime (including cyber-crime), illegal trafficking and terrorism (including cyber-terrorism), including understanding and tackling terrorist ideas and beliefs to also avoid aviation-related threats. The EU's external security policies in civilian tasks, ranging from civil protection to humanitarian relief, border management or peace-keeping and post-crisis stabilisation, including conflict prevention, peace-building and mediation, will also be invaluable in the region. Other priorities include collaboration in the field of smart technologies for civil registration, to strengthen border management with high-tech protection tools and introducing e-governance.

Cross cutting themes

- **Development and financing of infrastructure:** Adequate physical infrastructure is a key element of economic growth. However, the developing world needs far more financing for infrastructure than can be provided through overseas development aid and domestic public finances alone. The cost of maintaining existing infrastructure and undertaking necessary extensions of its coverage is estimated at 7 per cent of developing country GDP, equivalent to about 600 billion US dollars (USD) per year. Public spending on infrastructure in developing countries is presently around 3 per cent. Given the shortage of public funds in most developing countries, one solution is to invite greater private sector participation and expand the use of public-private partnerships (PPP).
- **Adopt an evidence-based approach to policy:** The national position papers identified that most of the seven countries under consideration had developed policies aimed towards the thematic areas in Horizon 2020. However, the quality of the policymaking, as well as policy implementation and evaluation, was frequently questioned. Evidence based policy can have an even more significant impact in developing countries. Evidence based policy is a discourse or set of methods which informs the policy process, rather than aiming to directly affect the eventual goals of the policy. It advocates a more rational, rigorous and systematic approach. The pursuit of evidence based policy is based on the premise that policy decisions should be better informed by available evidence and should include rational analysis. This is because policy which is based on systematic evidence is seen to produce better outcomes. The approach has also come to incorporate evidence-based practices. Evidence based policy tends to be less well established in developing countries than in developed ones, and therefore the potential for change is greater. Better utilisation of evidence in policy and practice can help save lives, reduce poverty and improve development performance in developing countries.
- **Capacity building and sustainable development:** International cooperation and collaborations will be essential to address and tackle common global societal challenges, and the need for cooperation towards capacity development was frequently identified at the national level within South Asia.

The concept of capacity building or capacity development appeared in the late 1980s and became deeply entrenched within the development agenda in the 1990s. Rather than representing a new idea, it reflected growing criticism of many development assistance programmes. In contrast to this extraneous approach, it emphasised the need to build development on indigenous resources, ownership and leadership and by bringing human resources development to the fore. The concept of capacity development was therefore a move away from 'aid' or 'assistance' towards a 'help yourself' approach that was designed to prevent a dependency on aid emerging. Capacity development is based on learning and acquisition of skills and resources among individuals and organisations. While this process may rely on some imported resources, external capacity is seen as a knowledge-sharing device, which allows the strengthening and developing of the local capacity. As such, it relates closely to some definitions of resilience, which stress the objective is to build resilience by maximising the capacity to adapt to complex situations, and whereby resilience describes an active process of self-righting, learned resourcefulness and growth.



Capacity development is committed to sustainable development, to a long rather than short term perspective, and attempts to overcome the shortcomings of traditional donor- led projects that have been prevalent in many development projects — typically criticised for being too short term rather than sustainable, and not always addressing the needs of the recipients. Development within a capacity building context allows communities and countries to identify their own needs, and design and implement the best strategy within the local context. As a process, it builds on monitoring and evaluation in order to identify existing capacities, deficiencies and the progress and achievements of development.

2. Introduction

This regional position paper is a summary of the South Asian region's status and interests concerning the seven thematic societal challenges identified under the EU's Horizon 2020 research programme: Health, demographic change and wellbeing; Food security, sustainable agriculture, marine and maritime research and the bio-based economy; Clean and efficient energy; Smart, green and integrated transport; Climate action, resource efficiency and raw materials; A changing world - inclusive, innovative and reflective societies; and, Secure societies - protecting freedom and security of the country and its citizens.

The paper considers the position of seven countries in South Asia: Afghanistan; Bangladesh; Bhutan; Maldives; Nepal; Pakistan; and, Sri Lanka¹. It also identifies national and regional priorities for the seven themes under consideration.

Table 1: Country profiles

South Asian Country ¹	Income level ²	Population (2013, million) ³	Population growth (annual %) ²	Land area (sq. km) ⁴	GDP per capita (2013, current US\$) ⁵	Life expectancy at birth (2012, years) ²	Literacy rate, adult total (% of people ages 15 and above) ⁶
Afghanistan	Low	30.55	2.4	652,860	664.8	61	32
Bangladesh	Low	156.60	1.2	130,170	957.8	70	59
Bhutan	Lower middle	0.75	1.6	38,117	2,362.6	68	-
Maldives	Upper middle	0.35	1.9	300	6,665.8	78	-
Nepal	Low	27.80	1.2	143,350	694.1	68	57
Pakistan	Lower middle	182.14	1.7	770,880	1,275.3	66	55
Sri Lanka	Lower middle	20.48	0.8	62,710	3,279.9	74	91

There is great diversity among the seven South Asian countries considered within this paper, as summarised in Table 1.

There are several countries covering a large land area (Afghanistan, Pakistan), while there are also very small countries by land area (Bhutan), including a small island state (Maldives). Several are land locked (Afghanistan, Bhutan and Nepal), while others are islands (Maldives, Sri Lanka) or have substantial coastal regions (Bangladesh, Pakistan).

Similarly, populations range from the very small (Maldives, Bhutan) to some of the largest in the world³ (Bangladesh is 8th, Pakistan is 6th). All seven countries are experiencing population growth, but the rate of growth varies greatly, from 0.8% per annum (Maldives), to 2.4% (Afghanistan).

The region has three low income countries (Afghanistan, Bangladesh and Nepal) but also an upper middle income country (Maldives). The others (Bhutan, Pakistan and Sri Lanka) are all lower middle. Health and education also vary greatly. Conflict affected Afghanistan has very poor indicators in health and education, while Sri Lanka for example, has a comparatively high adult literacy rate.

Despite these diverse profiles, the region faces many common concerns that link to the Horizon 2020 societal challenges.

¹ India is not considered within this regional paper, as specified within the EU FP7 call associated with this project

² World Bank Country and Lending Groups

³ United Nations Population Division, World Population Prospects

⁴ Food and Agriculture Organization, electronic files and web site

⁵ World Bank national accounts data, and OECD National Accounts data files

⁶ UNESCO Institute for Statistics

3. Context of this position paper

3.1. CASCADE project

This regional position paper is an output of the CASCADE project (Collaborative Action towards Societal Challenges through Awareness, Development, and Education) that aims to provide the foundation for a future International Cooperation Network programme targeting South Asian Countries, which will promote bi-regional coordination of Science & Technology cooperation.

The EU, whilst representing only 7% of the world's population, is responsible for 24% of world expenditure on research, 32% of high impact publications and 32% of patent applications, making it a world leader in research and innovation⁷. However, over the past few decades, new key players have emerged within the international landscape shifting the previously dominant position held by the EU towards emerging economies.

The EU recognise a need to strengthen internationalisation through strategic policy action. The need for linkages with Asian countries has been highlighted given the region's rapidly growing research and innovation capacities and the urgency to address global challenges⁸. South Asia in particular is home to more than 40% of the world's absolute poor, but will contribute nearly 40% of the growth in the world's working-age population in the coming decades.

CASCADE is an opportunity for raising awareness of the potential for EU-Southern Asia cooperation and stimulating regional and international participation. With the active contribution of South Asian countries, the endeavour will be to pave the way for more advanced, inclusive and innovative societies.

3.2. Horizon 2020

The project coincides with the launch of Horizon 2020, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Running from 2014 to 2020 with a budget of just over €80 billion, the EU's new programme for research and innovation is part of the drive to tackle global societal challenges, and create new growth and jobs. International cooperation in research and innovation is an essential element for meeting the objectives of Europe 2020. Recognising the global nature of producing and using knowledge, Horizon 2020 builds on the success of international cooperation in previous framework programmes and is fully open to participation from third countries.

The 18 month CASCADE project is led by Professors Dilanthi Amaratunga & Richard Haigh from the University of Huddersfield, UK but targets and has the participation of all seven South Asian countries specified in the call: Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka.

The project set out to:

1. Compile a regional position paper that identifies global challenges and research priorities
2. Map and develop an inventory of national and regional stakeholders related to global challenges
3. Raise awareness on research & innovation priorities for fostering cooperation and towards building mutual understanding on how to address common global societal challenges

Further information about the project can be found at www.cascade-inconet.eu.

⁷ European Commission (2012) International cooperation in science, technology and innovation: strategies for a changing world – report of the expert group established to support the further development of an EU international STI cooperation strategy. Brussels: European Commission.

⁸ Annerberg, R., Begg, I., Acheson, H., Borrás, S., Halle, A., Maimets, T., Mustonen, R., Raffler, H., Swings, J., and Ylihonko, K. (2010) Interim evaluation of the seventh framework programme: report of the expert group.

3.3. Methodology

This regional paper draws upon the findings of seven national positions developed for Afghanistan⁹, Bangladesh¹⁰, Bhutan¹¹, Maldives¹², Nepal¹³, Pakistan¹⁴ and Sri Lanka¹⁵. In doing so, it provides a regional perspective on global societal challenges of mutual interest to the EU and South Asian region.

Table 2: Lead contributors to national and regional papers

National / regional paper	Lead contributors
Afghanistan	Nangarhar University
Bangladesh	Patuakhali Science and Technology University Asian Disaster Preparedness Center
Bhutan	Royal Institute of Management
Maldives	ECO CARE
Nepal	Institute of Engineering Volunteers for Development Nepal
Pakistan	University of Engineering & Technology, Peshawar Local Councils Association of the Punjab
Sri Lanka	University of Moratuwa, Sri Lanka Federation of Sri Lankan Local Government Authorities
South Asia	University of Huddersfield University of Central Lancashire Asian Disaster Preparedness Center

Although each national paper was developed and written by a local, in-country team (Table 2), data collection and analysis was coordinated to ensure consistency. This was achieved through a series of briefing and training events, as well as the issuing of standard protocols and templates. A detailed presentation of the data collection and analysis carried out for each country can be found in the respective national position papers. Below is a summary of the overall methodology.

The methodology was carried out in two phases. Phase 1 consisted of a detailed policy analysis and Phase 2 used a combination of semi-structured interviews and focus groups.

During phase 1, a content analysis approach was carried out to analyse available policies in the seven South Asian countries targeted by the CASCADE project. The focus was specifically on each of the seven societal challenges targeted under Horizon 2020. This phase set out the current statistics and trends, assessed the policy availability in each area, carried out a situational analysis, and finally, identified key informants that have knowledge or are responsible for developing policies in those areas. These key informants provided the basis for identifying interview and focus group respondents in phase 2.

During the 2nd Phase of the project, semi-structured interviews were used to gather information on each of the Horizon 2020 challenges, and to gain an understanding of each challenge and its impact to the society and country. The experts represented academia, industry and public organisations. 348 interviews were conducted across the seven countries, as summarised in Table 3.

Following analysis of the interview data, a series of focus groups was conducted to get an overall perspective and consensus on all seven Horizon 2020 challenges, and to get an understanding of the key challenges and their impact to the society and country. There were 135 participants in sixteen focus groups across the seven countries, as summarised in Table 4. The experts represented academia, industry and public organisations.

⁹ Sherzaman, S., Sarwary, N., Noor, N., Darmal, B., Adil, A. (2014) Afghanistan national position paper on Horizon 2020 societal challenges. CASCADE project.

¹⁰ Asian Disaster Preparedness Center and Patuakhali Science and Technology University (2014) Bangladesh national position paper on Horizon 2020 societal challenges. CASCADE project.

¹¹ Tshering, J. (2014) Bhutan national position paper on Horizon 2020 societal challenges. CASCADE project.

¹² Khalid, H. (2014) Maldives national position paper on Horizon 2020 societal challenges. CASCADE project.

¹³ Sitoula, N. and Parajuli, B. (2014) Nepal national position paper on Horizon 2020 societal challenges. CASCADE project.

¹⁴ Hussain, A., Umar, M., Ahmad, N. (2014) Pakistan national position paper on Horizon 2020 societal challenges. CASCADE project.

¹⁵ Goonasekera, H., Gunatillake, S., Hettiarachchi, S., Weerasinghe, S. (2014) Sri Lanka national position paper on Horizon 2020 societal challenges. CASCADE project.

The analysis and writing up of the national position papers was led by the local in-country teams from the CASCADE partner organisations (Table 2). Draft papers were presented to the CASCADE steering committee, and subject to a cycle of feedback and re-writing.

Table 3: Interviews conducted

Challenge ¹⁶	Afghanistan	Bangladesh	Bhutan	Maldives	Nepal	Pakistan	Sri Lanka	Total
1	2	13	5	4	3	18	2	47
2	2	18	7	6	2	19	1	55
3	4	7	3	5	2	13	1	35
4	3	6	4	4	2	19	1	39
5	5	27	7	5	2	29	2	77
6	2	13	4	2	4	8	2	35
7	2	7	4	4	2	39	2	60
Total	20	91	34	30	17	145	11	348

Upon completion of the national papers, a team was appointed to draft the regional paper, which would draw upon the findings of all seven national papers. Priorities and opportunities for EU-South Asian cooperation in research and innovation were proposed based on a summary of the national papers, and subsequently discussed and agreed during several project meetings with the CASCADE consortium.

Table 4: Focus groups participants (number of focus groups in brackets)

	Afghanistan	Bangladesh	Bhutan	Maldives	Nepal	Pakistan	Sri Lanka	Total
Total	13 (1)	21 (3)	23 (1)	11 (2)	22 (1)	12 (2)	33 (6)	135

¹⁶ 1 - Health, demographic change and wellbeing; 2 - Food security, sustainable agricultures, marine and maritime research and the bio-based economy; 3 - Clean and efficient energy; 4 - Smart, green and integrated transport; 5 - Climate action, resource efficiency and raw materials; 6 - A changing world - inclusive, innovative and reflective societies; and, 7 - Secure societies - protecting freedom and security of the country and its citizens.

4. Thematic societal challenges

4.1. Health, demographic change and wellbeing

Horizon 2020: Responding to this challenge, research and innovation (R&I) under Horizon 2020 is an investment in better health for all. It aims to keep older people active and independent for longer and supports the development of new, safer and more effective interventions. R&I under Horizon 2020 also contributes to the sustainability of health and care systems.

South Asia faces wide-ranging public health challenges. Low life expectancy and high rates of malnutrition, infant mortality, and incidence of tuberculosis (TB) and HIV/AIDS are second only to those of sub-Saharan Africa¹⁷. The region also faces challenges such as poor sanitation, poor maternal health, and poor access to healthcare services, as well as widespread malaria.

While there have been some improvements in the health sector, it has been unevenly distributed between and within countries. For example, rural areas do worse than urban areas in life expectancy, immunisation rates, maternal health, malaria incidence, and access to almost all health services.

Table 5: Incidence of tuberculosis per 100,000 people, 2013 (Source: World Health Organisation, 2014)

Afghanistan	189
Bangladesh	224
Pakistan	275

Many of the seven South Asian countries being considered in this paper face severe challenges from a range of diseases. However, incidence rates vary greatly from country to country, in part due to demographic and geographic concentration.

Table 5 illustrates the extent of the tuberculosis problem in Afghanistan, Pakistan and Bangladesh, which all feature prominently in the WHO's list of 22 high TB burden countries.

HIV/AIDS is also a challenge in parts of South Asia. Pakistan's adult prevalence of HIV/AIDS is 0.1% but increasing¹⁸. The problem is strongly linked to drug users, the prevalence of which roughly doubled from 10.8 percent in 2005 to 21 percent in 2008¹⁹. According to Nepalese government estimates, 0.5% of its population lives with HIV, representing a sharp increase, a near tripling, from 1997 to 2005²⁰. The HIV/AIDS epidemic in South Asia has contributed to a resurgence of tuberculosis (TB) morbidity and mortality. TB co-infection is the region's leading killer of HIV-positive people, who have accounted for a growing share of TB infections over the last decade. Directly observed treatment strategy (DOTS), the most effective known response to TB is now available in all South Asian countries, but the region has seen cases of multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB)²¹.

The region's anti-malaria programs have shown considerable progress and have reduced the reported incidence of the disease by approximately 25 percent in 10 years¹⁷. However, Malaria remains a problem in some countries. For example Pakistan faces an intransigent malaria epidemic during monsoon periods due to the presence of vast irrigation networks, and weak governance²². Poor health systems, insufficient trained staff, low levels of sanitation, and inadequate coordination at every level of government make political and financial leadership paramount. Nepal's malaria cases been

¹⁷ Public Health in South Asia (2010): A Report of the CSIS Global Health Policy Center

¹⁸ Population Reference Bureau, "HIV/AIDS Among Adult Population, Ages 15–49, 2007/2008

¹⁹ Yeda Samra Iqbal Jaferi, Muhammad Ilyas, and Muhammad Idrees, "AIDS crisis in Pakistan," *Journal of General and Molecular Virology* 1, no. 3 (October 2009): 33–34.

²⁰ Population Reference Bureau, "HIV/AIDS among Adult Population."

²¹ Peter Donald and Paul Van Helden, "The Global Burden of Tuberculosis—Combating Drug Resistance in Difficult Times," *New England Journal of Medicine* 360, no. 23 (June 4, 2009): 2393–2395.

²² WHO Regional Office for the Eastern Mediterranean, "Epidemiological situation: Country profiles: Pakistan," <http://www.emro.who.int/rbm/CountryProfiles-pak.htm>

more successfully controlled since 2000 but 80% of the population are still vulnerable to the infection. Insufficient health systems at every level starting from funding, staff, infrastructure, diagnostic and treatment capacity facilitate a continuation of endemic malaria in the vulnerable areas along Nepal's border with India²³. Similarly, the disease is highly prevalent in the hilly areas of Bangladesh. Environmental changes due to worsening climate change also have the potential to undo the region's malaria progress²³.

Shortfalls in health services, compounded by systemic poverty and malnutrition, result in one of the highest maternal mortality rates in the world. Again, the problem is not distributed evenly. While Sri Lanka sees 58 maternal deaths for every 100,000 births, Nepal sees 830. Nepal and Pakistan have skilled professionals at only 19% and 29% of births respectively. In order to reduce this gap, a major expansion of health workers is required to provide services before, during, and after childbirth.

The probability of dying from the four main non-communicable diseases (NCDs - cardiovascular diseases, cancer, chronic respiratory diseases and diabetes) is high in the region – see Table 6. This is in part due to the lack of a well-functioning civil/vital registration system for monitoring, weak health system infrastructure and inadequate funding for prevention and control of NCDs.

Table 6: Probability of dying from non-communicable diseases between the ages of 30 and 70 years (%) (Source: World Health Organisation, 2014)

Afghanistan	30.5
Bangladesh	17.5
Bhutan	20.5
Maldives	15.9
Nepal	21.6
Pakistan	20.5
Sri Lanka	17.6

In spite of the many health related challenges, South Asian countries on average spend less than 3.2% of their gross domestic products on health (see Table 7), which compares unfavourably to a global average of 8.2%¹⁷. Using these limited funds efficiently is also a major challenge.

Table 7: Health expenditure, total (% of GDP) (Source: World Health Organization Global Health Expenditure database)

	2010	2011	2012	2013
Afghanistan	8.5	8.1	8.5	8.1
Bangladesh	3.5	3.6	3.5	3.7
Bhutan	5.2	4.8	3.6	3.6
Maldives	5.8	8.1	11.4	10.8
Nepal	5.9	6.1	5.5	6.0
Pakistan	3.0	3.0	2.8	2.8
Sri Lanka	3.4	3.3	3.1	3.2

South Asia will also experience a dramatic increase in its elderly population by nearly nine times between 2010 and 2025 when life expectancy will increase to 75 years for men and 82 years for women. Bangladesh's 65-and-older population is

²³ World Malaria Report, 2014

projected to rise 5 percent in 2025 and 11 percent in 2050²⁴. This is the result of falling fertility rates and increasing life expectancy (Table 8).

While this is a problem for countries all over the world, South Asia faces some unique issues. Governments in the region don't devote many resources to the elderly. Bangladesh spends less than 0.5% of their GDPs on social pensions that benefit less than 20% of people over the age of 60²⁴. 76% of elderly Bangladeshis are excluded from government support and social protection. Similarly, Pakistan has no social safety net. This void of social safety nets for the elderly can be attributed to the fact that until the last 30 years, the lifespan for an average Pakistani was less than 60 years.

The significant rural-to-urban migration also means that the shape of the multigenerational family is shifting towards a more nuclear structure. Where previous generations could fully rely on living with their children or grandchildren to look after them in their old age, that is not necessarily the case today.

Table 8: Fertility and life expectancy (Source: United Nations Department of Economic and Social Affairs World Population Prospects: The 2012 Revision, Key Findings and Advance Tables)

	Total fertility (average number of children per woman)		Life expectancy at birth	
	2010-2015	2045-2050	2010-2015	2045-2050
Afghanistan	5.00	1.97	60.7	69.1
Bangladesh	2.20	1.69	70.5	80.1
Bhutan	2.26	1.67	68.0	77.2
Maldives	2.29	1.66	77.7	85.8
Nepal	2.32	1.71	68.2	77.5
Pakistan	3.22	1.99	66.5	71.1
Sri Lanka	2.35	1.91	74.2	79.9

National priorities

The national priorities for health, demographic change and wellbeing are summarised in Table 9. These have been extracted from each country's national position paper, which also includes further detail on the current status, actions taken by the Government and recommendations.

Table 9: National priorities for health, demographic change and wellbeing (extracted from national position papers)

Afghanistan⁹

- Development of integrated health policy based on the accurate data and real needs of people
- Transfer of knowledge and effective research work for diagnosis and prevention of diseases
- Restoration and upgrade of health care facilities, including expanded provision of services to rural areas
- Strengthened health information system through awareness amongst rural and urban population
- Training of health workers for sectors where shortage is acute (e.g. midwives, female nurses)
- Strengthened capacity of national authorities in emergency preparedness and response, mainly for recurrent natural disasters

Bangladesh¹⁰

- Increased investment in health infrastructure (e.g., hospitals, clinics and medical instruments) for enhancing medical service coverage especially in the rural areas
- Support the immunisation program for protection of infants from diseases
- Raise advocacy and awareness on healthcare preventive programmes highlighting maternal healthcare and prevention of HIV & Tuberculosis (TB) through community-based (including religious and community leaders) education and training and using print and electronic media

²⁴ HelpAge International

Bhutan¹¹

- The rising health care cost is the emerging number one issue to be tackled under this challenge - this is especially as all health in the country is free and even the international referrals are paid by the government
- The rising non-communicable diseases related to life style like diabetes and hypertension
- The aging index of 16.1 is a concern related to care and compassion

Maldives¹²

- Expand and improve the quality of available health services & establish tertiary level health services at regional levels, and ensure that all citizens have equitable access to comprehensive primary health care at the island level
- Establish sustainable health care financing and research, training and knowledge transfer activities & train professional people for sustainable and efficient health service delivery
- Improve access to medicines & Increasing access to essential, high-quality, effective and affordable medical products
- Establish regional level treatment facilities for drug addicts and anti-social behaviour
- Increase public confidence in the National Health System

Nepal¹³

- Nepal has 0.29 health workers for every 1,000 people; this is too low to provide basic health services to the population
- The migration of young people in the labour market to foreign countries is another key issue in the development of the social sector in Nepal
- The annual flow of young Nepalese in search of employment overseas has increased recently as more than 554,441 Nepali youths migrated in 2012 in search of a better life, due to the state's failure in creating employment back home – high migration of young people has affected agriculture, industry and demographic patterns
- The rehabilitation of elderly people is another challenge for the government of Nepal, because younger generations have often moved away from their birthplace for employment opportunities elsewhere; consequently, more elderly today are living alone and are vulnerable to mental problems like loneliness, depression and many other physical diseases

Pakistan¹⁴

- Develop an integrated health policy, improve health governance and assign authority to health professionals in strengthening four tiers of health care provision system
- Increase investment in the health sector, establish public-private partnerships, and develop physical & technological infrastructure of the health delivery system
- Raising awareness on healthcare preventive programmes through community-based (including religious and community leaders) education and trainings, and using print and electronic media
- State-of-the-art surveillance systems should be in place to detect outbreaks of diseases

Sri Lanka¹⁵

- Effective research and knowledge transfer activities for diagnosis and prevention of diseases
- Improving coordination and collaboration amongst different sectors, and the development of integrated systems
- Capacity building of health personnel for effective intervention and control programmes
- Tackling the growing burden of NCDs and addressing regional disparities in health indicators and access
- Addressing the care and well-being of the ageing population

Regional priorities

Key regional priorities for health, demographic change and wellbeing include:

Poor health indicators: Low life expectancy and high rates of malnutrition, infant mortality, and incidence of tuberculosis (TB) and HIV/AIDS, as well as widespread malaria are some of the major health challenges facing the region. Exchange of science and technology in the health sector is considered a key area of mutual collaboration. The transfer of knowledge will help south Asian countries to adopt new technologies, used for diagnosis, which can help in the early mitigation of diseases and by taking early steps through preventive measures. Priority areas for mutual collaboration with the EU in the health sector include devising an integrated health policy, developing physical and technological infrastructure for health care services and delivery, designing and practicing state-of-the-art surveillance systems to detect outbreaks of diseases treat early in time (e.g. cango virus, dengue fever, bird flue), and designing cost-effective and efficient vaccines for prevention of diseases (e.g. Hepatitis, TB, malaria, polio, rabies, measles).

Reducing the burden of NCDs: Lower-income countries generally have lower capacity for the prevention and control of noncommunicable diseases. To lessen the impact of NCDs on individuals and society, a comprehensive approach is needed that requires all sectors, including health, finance, foreign affairs, education, agriculture, planning and others, to work together to reduce the risks associated with NCDs, as well as promote the interventions to prevent and control them. There is an urgent need to lessen the risk factors associated with these diseases. Low-cost solutions exist to reduce the common modifiable risk factors (mainly tobacco use, unhealthy diet and physical inactivity, and the harmful use of alcohol) and map the epidemic of NCDs and their risk factors. Other ways to reduce NCDs are high impact essential NCD interventions that can be delivered through a primary health-care approach to strengthen early detection and timely treatment. The creation of healthy public policies that promote NCD prevention and control and reorienting health systems to address the needs of people with such diseases are also priorities.

Financing healthcare and affordability: Increasing access to affordable, quality health care is a priority across South Asia. Too many people, especially women, cannot get the medical treatment they need due to high costs, difficulties in getting permission to see a doctor or a lack of health care providers in rural areas. There is a need for capacity building for health personnel, disease awareness and prevention.

Addressing the care and well being of the ageing population: South Asia faces significant challenges in dealing with how future economic growth rates respond to the aging of the work force and the ultimate slowing in its growth. The region will need to ensure their social insurance systems are well adapted to confront the issues posed by an ageing population, and that the medical systems and social insurance are able to cope with the requirements of rising longevity, including the associated costs.

4.2. Food security, sustainable agricultures, marine and maritime research and the bio-based economy

Horizon 2020: A transition is needed towards an optimal and renewable use of biological resources and towards sustainable primary production and processing systems. These systems will need to produce more food, fibre and other bio-based products with minimised inputs, environmental impact and greenhouse gas emissions, and with enhanced ecosystem services, zero waste and adequate societal value.

Agriculture continues to be a very important livelihood option for the vast majority of South Asia's rural population, even though the sector's contribution to their economy is shrinking (Table 10). Much of South Asia has a large agriculture sector, with high usage of land area (Table 11). Agriculture is also a major employer (Table 12).

South Asian countries have moderate agricultural growth rates (Table 13) but an increased level of food consumption, primarily due to high population growth. Despite this growth, livelihood opportunities in agriculture are perceived to be poor, leading to a steady stream of migration to urban areas. Since the 1980s, the growth of rural populations has been steadily declining in South Asia (Table 14). This will lead to more land available per person, but also a tightening of rural labour markets. A negative growth rate is expected to set in by 2030-35. This has been identified as not being migration through choice but because other sectors are unable to offer low-skilled employment, and offers concerns for future food security.

Table 10: Agriculture, value added, % of GDP (World Bank national accounts data, and OECD National Accounts data files)

	2003	2013
Afghanistan	37.8	24.0
Bangladesh	21.8	16.3
Bhutan	25.2	17.1
Maldives	6.0	4.2
Nepal	37.5	35.1
Pakistan	23.4	25.1
Sri Lanka	13.2	10.8

Table 11: Agricultural land, % of land area (Source: Food and Agriculture Organization, electronic files and web site)

	2002	2012
Afghanistan	57.8	58.1
Bangladesh	71.9	70.1
Bhutan	13.4	13.6
Maldives	40.0	23.3
Nepal	29.6	28.7
Pakistan	35.4	35.1
Sri Lanka	37.6	42.9

Table 12: Employment in agriculture, % of total employment (Source: World Development Indicators 2008)

Afghanistan	-
Bangladesh	51.7
Bhutan	-
Maldives	17.3
Nepal	66.4
Pakistan	43.0
Sri Lanka	33.5

Table 13: Agricultural growth rates, annual % growth (Source: World Bank national accounts data, and OECD National Accounts data files)

	2010	2011	2012	2013
Afghanistan	-6.4	-7.6	18.2	-0.2
Bangladesh	6.2	4.5	3.0	2.5
Bhutan	0.9	2.4	2.2	2.9
Maldives	-0.9	1.1	4.9	-
Nepal	2.0	4.5	4.6	1.1
Pakistan	0.2	2.0	3.6	2.9
Sri Lanka	7.0	1.4	5.2	4.7

Table 14: Rural population, % of total population (Source: World Bank Staff estimates based on United Nations, World Urbanization Prospects)

	2000	2007	2013
Afghanistan	79	76	74
Bangladesh	76	72	67
Bhutan	75	68	63
Maldives	72	64	57
Nepal	87	84	82
Pakistan	67	65	62
Sri Lanka	82	82	82

The region is ranked as the most undernourished, malnourished and food insecure region in the world. Globally, the highest burden of hunger in absolute terms is to be found in Southern Asia²⁵. Estimates for 2014–16 suggest that about 281 million people are undernourished in the region, marking only a slight reduction from the number in 1990–92, despite there being progress in relative terms. Although most countries in Southern Asia have made progress towards the international hunger targets, the pace has been too slow for them to reach either the World Food Security or the Millennium Development Targets, including Afghanistan, Pakistan and Sri Lanka. Prevalence of malnutrition²⁶ is 33.6% in

²⁵ The State of Food Insecurity in the World

²⁶ Prevalence of child malnutrition is the percentage of children under age 5 whose height for age (stunting) is more than two standard deviations below the median for the international reference population ages 0-59 months

Bhutan, 40.5% in Nepal and 45% in Pakistan²⁷. Southern Asia (including India) has the highest proportion of children under age five who are underweight (46% in 2008), much greater than found in Sub-Saharan Africa (27% in 2008) or South Eastern Asia (25% in 2008)²⁸.

A notable exception in terms of performance is Bangladesh²⁵, which has made faster progress and has already reached the MDG 1c hunger target, thanks also to the comprehensive National Food Policy framework adopted in the mid-2000s. Nepal, also, has not only reached the MDG 1c hunger target, but has almost reached the 5% threshold²⁵.

While several of the South Asian countries are landlocked (Afghanistan, Bhutan, Nepal), fisheries and aquaculture production are an important contributor to the South Asian economy. The Indian Ocean represents one of the world's major fishing areas (Table 15), while Bangladesh is one of the World's top 25 major producer countries for both marine capture and inland waters. Pakistan is also a major producer for inland waters capture (19th globally)²⁹.

Table 15: Marine capture: major fishing areas (Source: FAO Global Capture Production database)

	2011	2012	Variation
Indian Ocean, Western	4,206,888	4,518,075	7.4%
Indian Ocean, Eastern	7,128,047	7,395,588	3.8%
World total	82,609,926	79,705,910	-3.5%

Capture fisheries make a significant contribution to GDP in the Maldives (26.6%), Bangladesh (2.0%) and Sri Lanka (1.3%), some of the highest figures globally. Aquaculture is also a notable contributor in Bangladesh (1.9%), Nepal (0.5%) and Sri Lanka (0.2%)³⁰.

Sri Lanka (43) and Maldives (18) are both home to a large number of species classified by the IUCN as endangered, vulnerable, rare, indeterminate, out of danger, or insufficiently known³¹.

Climate change is a long-term challenge to South Asia and the agriculture sector, affecting all four dimensions of food security: crop yields, food prices, food utilization and vulnerability of households. Evidence suggests that yields of rice could decline by 14 per cent, wheat by 44 to 49 per cent and maize by between 9 and 19 per cent.

Climate change multiplies the risks of natural hazards, through altered rainfall and temperature patterns as well as increased frequency and intensity of extreme events such as drought and flooding. Severe flooding in 2007 along the Ganges and Brahmaputra rivers affected over 13 million people in Bangladesh; flooding in Pakistan in 2010 severely affected 20 million people. The economic cost of the 2007 floods in Bangladesh was over US\$1 billion; in Pakistan it was nearly US\$10 billion. The Fifth Assessment Report of the Intergovernmental Panel on Climate Change, released in 2014, noted that climate change is already having a negative impact on agriculture, affecting major crops, livestock production and fisheries. These tropical areas of high exposure to climate change are also characterized by high food insecurity.

National priorities

The national priorities for food security, sustainable agricultures, marine and maritime research and the bio-based economy are summarised in Table 16. These have been extracted from each country's national position paper, which also includes further detail on the current status, actions taken by the Government and recommendations.

²⁷ World Health Organization, Global Database on Child Growth and Malnutrition

²⁸ Millennium Development Goals Report 2010

²⁹ FAO Global Capture Production database

³⁰ ESCAP's Statistical Yearbook for Asia and the Pacific 2007

³¹ Froese, R. and Pauly, D. (eds). 2008. FishBase database, www.fishbase.org

Table 16: National priorities for food security, sustainable agricultures, marine and maritime research and the bio-based economy (extracted from national position papers)

Afghanistan⁹

- Increased agricultural production and productivity; improved physical infrastructure and market development; the allocation of higher budget; and international collaboration in the sector
- Agricultural development should be driven by local consumer and market demand, adapting to Afghanistan's changing conditions, agro-ecological, social, and cultural diversity
- Agricultural and animal husbandry interventions are to be so designed to minimize negative environmental impact and enhance the natural resource base
- Identification of new crops with a good income to prevent farmers from cultivating poppy crops
- Introduction of new technologies for sustainable agriculture
- Development of need based policies and build strategic marketing systems for agricultural products
- Develop irrigation system to bring more land under cultivation

Bangladesh¹⁰

- Implementation of a national policy is necessary, which requires increasing the budget, improving agriculture and livestock governance, developing human resources and ensuring services delivery at grass-roots level
- Bangladesh needs a strong governance system to stop illegal food hoarding businesses
- The farmers should be able to obtain credits with more flexible conditions (e.g., 0% interest rate) if they are exposed to weather shocks, for instance
- Awareness and training programs are needed to make farmers aware of scientific cultivation, agro forestry, the bio-economy and other agricultural related sectors
- Inspiring farmers about agricultural insurance
- Cultivating early maturing and HYV (high yielding variety) to reduce crop damage due to flood and other natural disasters
- As an agrarian based economy, Bangladesh has to strengthen its agriculture sector for ensuring food security in a sustainable way

Bhutan¹¹

- Meeting the food needs of the nation, as well as going 100% organic, challenges the country to find innovative ways of meeting both of these objectives
- Over 70 % of the people depend on agriculture for their livelihood – the challenge is to develop the bio-based economy efficiently, which will feed the other sectors
- Marine research is close to nil because the country is landlocked, but inland water and fresh water research could be valuable the nation

Maldives¹²

- Promote agriculture and fisheries as a means of investment, and as an acceptable and feasible means of livelihood
- A national food security strategy must be formulated, and the Maldives should increase its effort to utilise untapped islands which can be developed into agricultural islands and increase own agricultural products
- Introduce relevant technologies to improve harvests and establish regional food storage facilities to ensure food security among the population
- Promote research, training and technical development in the marine, fisheries and agriculture sector, and establish agriculture and fisheries financing and research for sustainability and efficiency
- Tap new fishery resources & promote marine research to improve use of marine resources

Nepal¹³

- There is limited access to food among poor households (households that do not have enough to eat for the whole year) in more than one third of districts in the country
- Malnutrition problems are still very high; the stunting of growth rate is high mainly in the hills and mountain regions
- Whatever food stuff is available, due to a lack of nutritional knowledge there is an imbalance and various health problems arise which seriously impacts on reproduction and a healthy life
- There is a predominance of subsistence farming, a low seed replacement rate and low productivity of agriculture, as a result of a lack of attraction to this sector, especially from the younger generation, which poses serious threats to the sustainability of Nepalese agriculture
- Various push and pull factors including unpredictable rainfall and drought as well as massive degradation of arable land for commercial and urbanization purposes have also compounded the problem

Pakistan¹⁴

- National policy execution is essential and that requires increasing budget, improving agriculture and livestock governance, developing human resources and ensuring services delivery at a grass root level
- Water conservation and management and exploitation of water resources
- Waste management and treatment to improve quality of surface and subsurface water are key areas to address water pollution, ensure good agriculture processes and better manufacturing practices
- Natural resources management requires attention but lacks governance capacity of the relevant departments and needs increased funding
- Biotechnology research for improved productivity and exploitation of sea-based resources to boost the economy

Sri Lanka¹⁵

- Addressing the lack of standards and quality of agricultural produce by ensuring and maintaining quality and standards during the production, packaging and transportation of food products, making the produce more appealing, particularly to global markets
- Improving the quality of life of farmers and fishermen
- Identification of new crops and appropriate areas for cultivating different types of crops for improved yields and quality of produce
- Use of new technologies and making better and more effective use of existing data and technologies for sustainable agriculture and fisheries

Regional priorities

Key regional priorities for food security, sustainable agricultures, marine and maritime research and the bio-based economy, include:

New and climate resistant crops and varieties (e.g., high yield varieties) and technologies to increase productivity and sustainability: The health and well-being of the world's growing population are largely dependent on the ability of the agricultural industry to raise high yielding and climate resistant food crops. Inclusive growth provides opportunities for those with meagre assets and skills, and improves the livelihoods and incomes of the poor, especially in agriculture. It is therefore among the most effective tools for fighting hunger and food insecurity, and for attaining sustainable progress. Enhancing the productivity of resources held by smallholder family farmers, fishing and forest communities, and promoting their rural economic integration through well-functioning markets, are also essential elements of inclusive growth. Technology and knowledge transfers can also help in achieving increased productivity and quality standards (particularly in relation to packaging and transportation) of agricultural and fish produce. This would, in turn, aid in the creation of new international markets for local produce.

Protecting agricultural lands: A large proportion of South Asian land area is in agricultural use. How this important natural resource is used is vital to sustainable development. This includes taking the right decisions about protecting it from inappropriate development.

Improve farmers' quality of life and livelihood security: Improving the quality of life of farmers and fishermen will be important to sustain agriculture and discourage rural to urban migration. Improving the productivity of resources held by family farmers and smallholders is, in most cases, an essential element of inclusive growth and has broad implications for the livelihoods of the rural poor and for the rural economy in general. Well functioning markets for food, inputs and labour can help to integrate family farmers and smallholders in the rural economy, and enable the rural poor to diversify their livelihoods, which is critical for managing risk, and reducing hunger and malnutrition.

Use of bio-technology in marine and fisheries to exploit sea based resources: Marine biotechnology is essential to satisfy the growing demand for healthy products from fisheries and aquaculture in a sustainable way. The growing demand for marine food will need to be increasingly delivered through intensive aquaculture. Marine biotechnology has the potential to contribute significantly to increasing production efficiency and product quality, to the introduction of new species for intensive cultivation, and to the development of sustainable practices in South Asia.

4.3. Clean and efficient energy

Horizon 2020: The energy challenge is designed to support the transition to a reliable, sustainable and competitive energy system.

South Asia's energy system is characterised by energy that is imported, expensive, environmentally unsustainable, and dependent on coal, oil, wood and natural gas. Regular power outages, inadequate and unreliable distribution networks and high energy costs are common to the energy sector across the region.

Economic (Figure 1) and population growth (Table 1) in South Asia has resulted in rapid increases in energy consumption in recent years, well above rates seen in developed countries. South Asia has three low income countries (Afghanistan, Bangladesh and Nepal) but also an upper middle income country (Maldives). The others (Bhutan, Pakistan and Sri Lanka) are all lower middle. Similarly, populations range from the very small (Maldives, Bhutan) to some of the largest in the world³ (Bangladesh is 8th, Pakistan is 6th). All seven countries are experiencing population growth, but the rate of growth varies greatly, from 0.8% per annum (Maldives), to 2.4% (Afghanistan).

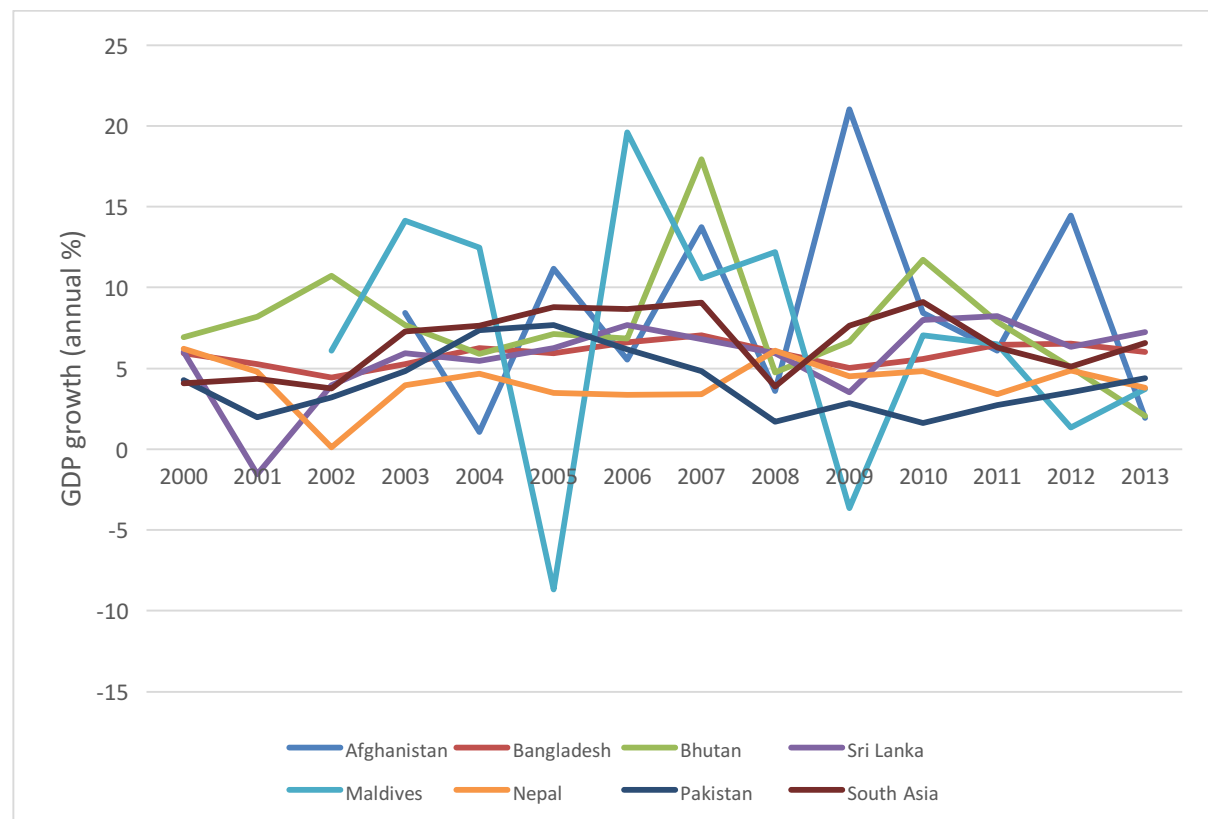


Figure 1: GDP growth, annual % (Source: World Bank national accounts data)

Despite growing in energy demand, South Asia continues to average among the lowest levels of per capita energy consumption in the world. Afghanistan is the lowest, Bangladesh 3rd lowest and Nepal 9th lowest (total energy consumption per capita per annum kgoe/a³²). Several of the target countries in the region already have a high percentage of their population with access to electricity, including the Maldives (99.9%), Pakistan (91.4%) and Sri Lanka (85.1%), while others

³² World Development Indicators. World Bank

have very low rates of access, including Afghanistan (41%) and Bangladesh (55%)³³. Rural electrification rates are very low in some countries (Table 17).

Table 17: Electricity access in 2011 (Source: International Energy Agency, 2013)

	Population without electricity (millions)	Electrification rate (%)	Urban electrification rate (%)	Rural electrification rate (%)
Bangladesh	61	60	90	48
Nepal	7	76	97	72
Pakistan	56	69	88	57
Sri Lanka	3	85	96	84

EIA's International Energy Outlook 2013 (IEO2013)³⁴ projects that growth in world energy use largely comes from countries outside of the Organization for Economic Cooperation and Development (OECD). Energy use patterns for countries inside the OECD are relatively stable between 2010 and 2040 as primary energy use is projected to grow by 0.5% per year, roughly the same rate as population growth in those countries. In non-OECD countries, faster growing economies and changing habits in highly concentrated populations drive significant increases in energy use. Energy use in non-OECD countries is projected to grow by 2.2% per year, and the share of non-OECD energy use is expected to rise from 54% of total world energy use in 2010 to 65% in 2040. Energy consumption per person is predicted to rise in developing countries as they grow richer and their citizens covet energy consuming products. In the EIA forecasts, energy use per capita remains flat in OECD countries over the next 30 years but jumps 46 percent in the developing world.

Economic and population growth places significant pressures on each country's respective energy sectors, and South Asia is likely to contribute to a major share to the incremental demand for hydrocarbons during the first half of this century. All the South Asian countries are highly dependent on import of fuels, particularly hydrocarbons, and this dependence has been increasing over the decades. Bangladesh meets 94% of its oil and 45% of its coal demand through imports, while Pakistan imported 25% of its energy. More than half of the total energy consumption in South Asia is still contributed by non-commercial energy sources like animal waste, wood, or other biomass, although the spread of electricity and the penetration of fuel products for lighting and cooking has led to a gradual reduction in the share of biomass in most of these countries.

Biomass accounts for 68% of primary energy consumption in Bangladesh, and over 90% of household energy. Domestic natural gas accounted for 68% of the country's commercial energy consumption in 2010; imported oil and coal for another 26% and local hydropower for 5.4%. About 88% of the country's power was generated from gas and about half the commercial energy consumption was for power generation³⁵. Commercial energy consumption in Pakistan is met from a mix of gas (49%), oil (31%), electricity (13%) and coal (7%) – all of which cumulatively account for almost half of national GHG emissions. Almost two-thirds of the population depends on biomass fuel to meet domestic needs³⁶. Of the total energy consumption in Nepal in 2008/9, traditional sources accounted for 87% and commercial sources for 12%, with new renewable sources accounting for just 1%. Of commercial fuels, 60% are petroleum, with coal and grid electricity (mainly hydropower) each being 13%.

Fuel resource endowments of these countries have certain complementarities, which suggest that intra-regional energy cooperation would greatly help mitigate individual country energy security risks. Pakistan and Bangladesh account for significant natural gas and coal resources, while Bhutan and Nepal have large hydropower resources. Pakistan also has nuclear power generation capabilities. Sri Lanka has good hydro power generation potential. There is an emerging presence of private sector in power generation in Bangladesh, Nepal, and Pakistan, and this presence is likely to grow in other countries as well. Many of the countries have substantial renewable energy potential (see Table 18). The sharing of these resources offers potential for more optimal energy supply solutions for the entire region.

³³ Sustainable Energy for All (SE4ALL) database from World Bank, Global Electrification database

³⁴ [http://www.eia.gov/forecasts/ieo/pdf/0484\(2014\).pdf](http://www.eia.gov/forecasts/ieo/pdf/0484(2014).pdf)

³⁵ Reegle, Bangladesh, www.reegle.info/policy-and-regulatory-overviews/bd

³⁶ Reegle, Pakistan, www.reegle.info/policy-and-regulatory-overviews/pk

Table 18: Renewable potential (Source: Christian Aid, Low-carbon Development in South Asia: Leapfrogging to a green future)

Bangladesh

Renewable energy (RE) sources include biomass (combustible renewable and waste), hydropower, solar, wind, ocean, and geothermal energy. Solar energy, for both small and large-scale electricity generation, has good prospects in Bangladesh. Bangladesh receives an average daily solar radiation of 4-6.5kWh/m². Solar photovoltaic (PV) is gaining acceptance – about 264,000 households use solar energy. The abundance of biomass makes it a potential source for biodiesel. The most common forms of available biomass are rice husk, crop residue, wood, jute stick and sugarcane. Biogas is another promising renewable energy resource. There are about 50,000 household and village biogas plants throughout the country. Micro hydro and mini hydro have limited potential in Bangladesh, with the exception of Chittagong Hill Tracts. Hydropower assessments have identified some possible sites which could supply 10kW to 5MW.

Nepal

Nepal Hydropower holds high potential for use of renewable energy, with an economic potential of 42,000MW. Small hydro also has significant potential in Nepal. A combined 18.1MW of micro hydro projects (including improved water mill electrification projects) have been installed. The target is to support installation of an additional 25MW to electrify 150,000 households by 2017. Biogas is another major source of energy. Based on its domestic cattle population, Nepal has technical potential in the range of 1.3 million-1.9 million biogas plants. The economic potential is estimated to be 600,000 plants. There are 290,510 household biogas plants in Nepal as at 2012. Nepal has 300 days of sunshine in about 70% of land area, with average solar radiation in the range of 3.6-6.2kWh/ m²/day (NPC, 2013). The Solar and Wind Energy Resource Assessment in Nepal shows commercial potential of 2,100 MW grid-connected solar power. There is a huge potential for solar thermal devices such as water heaters, dryers and cookers. Solar water heaters have been commercialised for decades and there are more than 185,000 installations in the country. A study by WECS, the Department of Hydrology and Meteorology and AEPC in 1999-2002 showed that wind energy potential in Nepal is limited to a few places in high mountainous regions like Thakmarpha, Khumbu and Kanjiroba, which have little infrastructure development. AEPC's most recent study in 2008 showed a potential 3,000MW of commercial wind power.

Pakistan

Pakistan has a large biomass potential, which can be utilised very effectively for addressing energy demand in rural areas, as well as supplementing urban power houses. It is currently the fastest growing renewable energy technology in Pakistan, with more than 4,000 biogas plants in operation and several biogas power plants (57MW capacity in total) are either already operational or are in the pipeline. The major sources of biomass energy are crop residues (25%), animal manure (50%) and municipal solid waste (25%). According to the Water and Power Development Authority, the total installed capacity in Pakistan is 22,477MW, of which 30% are hydroelectric plants. Pakistan has three large hydropower plants – Terbel (3,500MW), Ghazi Brotha (1,450MW), and Mangla (1,000MW); the other hydropower plants are below 250MW. The remaining hydro potential is 35GW, with the possibility to develop 8,000MW in the midterm.

National priorities

The national priorities for clean and efficient energy are summarised in Table 19. These have been extracted from each country's national position paper, which also includes further detail on the current status, actions taken by the Government and recommendations.

Table 19: National priorities for clean and efficient energy (extracted form national position papers)

Afghanistan⁹

- Exploitation of the huge potential of hydro power and fossil fuels for energy production through foreign investment
- Increased operating efficiency through rehabilitation of existing infrastructure and introduction of smart technologies
- Investments in transmission and distribution (use of smart grids) to reduce losses
- Increased institutional capacity (strengthen higher education institutions) and increase private sector involvement
- Focus on efficient use of energy by developing specific awareness programs through media, community development councils and social networks

Bangladesh¹⁰

- Increase investment in the energy sector for generating more electricity and improving transmission infrastructure
- An appropriate surveillance system needs to be in place to minimise electricity system loss
- Special emphasis should be given to the renewable energy sources that can trickle down the fuel crisis in the long run
- A special energy program needs to be taken to serve marginalised groups such as people living in the Hill Tracks and coastal areas of Bangladesh

Bhutan¹¹

- Harness the hydropower resources without adverse effects to the society and use this to cut down fossil fuel imports
- Invest in alternate sources of energy like the solar, wind, and bio-mass
- Stabilize the hydropower generation capacity so that the climatic risks are minimized

Maldives¹²

- Foster Smart Cities and Communities and acquire Smart Grid and Sound Water Technologies suitable for small islands, and encourage private sector involvement to ensure further development of the sector
- Expand use of renewable technology in all sectors to reduce emissions by encouraging private sector involvement and ensure further development of the sector
- Strengthen a low emission development future and ensure energy security for the Maldives
- Development of National Smart Power Grid and microgrids to ensure reliable, resilient and efficient delivery of power and utility modernization
- Promote research, training and technical development in the energy sector, and deliver clean, reliable, affordable, accessible, environmentally appropriate and sustainable energy services to improve the quality of life
- Developing suitable monitoring mechanisms, reviewing incentive mechanisms (such as subsidy) for the power sector and creating awareness programs to target demand side management

Nepal¹³

- Lack of appropriate energy policy
- Lack of confidence of beneficiaries as well as policy makers on benefits and potential of secure, clean and efficient energy
- Lack of adequate capacities and technical know-how, and an underdeveloped supply chain
- Expansion of national power grid and connecting to that of India for export earnings and to correct the seasonal imbalance in availability of water and power
- Increase the share of hydroelectricity in energy consumption in all spheres of the economy, such as domestic consumption, transportation, industry, and commercial use
- Encourage the use of improvised cooking stoves in order to bring down the requirement of firewood and smoke pollution in rural household cooking
- Inadequate public financial support system and limited access to project finance

Pakistan¹⁴

- Exploitation of indigenous resources and foreign investments are needed to develop the power sector
- The country should benefit from the vast potential for Hydel Power, launching large hydel projects and improving hydel:thermal mix to 70:30
- Investment and research are required to exploit the vast potential of coal reserves in Pakistan, with potential of 100,000 MW
- Alternate source of energy potential like wind, solar and biomass, requires exploitation for both small and large scale usages
- Energy conservation and management requires attention, including practices to reduce energy losses in transmission and distribution lines, and reduce household and plant energy consumption

Sri Lanka¹⁵

- To achieve 100% electrification through expanding the distribution network; developing the low and medium voltage network, development of the electricity distribution network in the North and East, and improving the delivery system related infrastructure with long term, committed investment to ensure accessibility to all
- To achieve an affordable, reliable and sustainable energy supply through increasing electricity generation capacities, petroleum refining and storage capacities, investment in renewable energy technologies and for the maintenance of critical infrastructures
- Maximising these investments through policy by facilitating localised solutions to promote energy efficiency
- Prioritise viable renewable energy resources through resource identification and planning

Regional priorities

Key regional priorities for clean and efficient energy include:

Harness hydro, wind, solar, biomass and other renewables: Achieving ambitious deep cuts in emissions and accelerating green growth will require the development and diffusion of carbon-efficient technologies. South Asia has great potential for energy efficiency and renewable energy, including hydro, geothermal, wind, solar and tidal energy.

Conservation and efficiency improvements through smart national power grid, including transmission and distribution: Innovative finance mechanisms and policies are needed to reduce the risks perceived by mainstream lending institutions in

cleaner technology investments and to enhance their capacity to finance low-carbon technologies and resource options. Extensive research activities on energy consumption and the efficient use of energy is required, including exchange of science knowledge on the use of smart technologies used in the energy sector for improving efficiency and security, and introducing environmentally friendly technologies for producing energy.

Regional cooperation in knowledge sharing, energy development and trade: There is a need to understand the national energy policies and resource endowments of these countries in order to identify common features and complementarities necessary for a viable regional energy security framework. South Asian countries need enhanced regional energy transfer to leverage economies of scale through a more vibrant intra and inter regional energy trade structure. Key issues faced in energy sector cooperation are centered on the need to develop a regional power market, energy supply availability, energy trade infrastructure, and harmonised legal and regulatory frameworks.

4.4. Smart, green and integrated transport

Horizon 2020: This challenge aims to boost the competitiveness of the European transport industries and achieve a European transport system that is resource-efficient, climate-and-environmentally-friendly, safe and seamless for the benefit of all citizens, the economy and society.

The quality of transport infrastructure is a key determinant of performance in the transport sector and development of transport infrastructure supports economic growth. Transport infrastructure is a critical ingredient in economic development at all levels of income. It supports personal well being and economic growth, but transport is also a major source of air and noise pollution. Countries spend considerable amounts of money each year to build, maintain and improve their transport infrastructure in response to the growing passenger and freight mobility needs, and the need to renew aging infrastructure.

South Asia ranks poorly in global quality of trade and transport infrastructure (Table 20). Only Pakistan (69) and the Maldives (82) appear in the top 100 of 160 ranked in the 2014 LPI Global Survey. Bangladesh (138) and Afghanistan (158) have some of the poorest transport infrastructure globally.

Table 20: Quality of trade and transport related infrastructure e.g., ports, railroads, roads, information technology
(Source: LPI Global Rankings 2014)

	Ranking	Infrastructure indicator
<i>Germany</i>	1	4.32
Pakistan	69	2.67
Maldives	82	2.56
Nepal	122	2.26
Sri Lanka	126	2.23
Bhutan	132	2.18
Bangladesh	138	2.11
Afghanistan	158	1.82
<i>Somalia</i>	160	1.50

Weak transport integration is also a problem across South Asia. An integrated and efficient transport network is an essential element of the enabling environment for a globalised economy. Transport cost is a significant determinant of competitiveness. Due to lack of integration of the transport system in South Asia, the logistic costs are very high and ranges between 13–14 percent of GDP, compared to 8 percent in the USA³⁷.

Integration of the transport network of South Asia is especially crucial to countries such as Nepal and Bhutan. Such integration could serve to end their landlocked or semi-isolated status and provide shorter transport and transit links to their desired destinations including access to the sea.

The surface transport networks in South Asia still continue to remain fragmented due to various historical, political, and economic reasons as well as lack of cooperation among the member countries. Railway also has potential as a mode of surface transport for long distance freight traffic, but its use is constrained by different gauges, track structures and signalling, and incompatible rolling stocks. Several countries, including Afghanistan (75km), Nepal (59km) have very small railway networks³⁸. Maritime transport is a major mode of transport in South Asia. A number of maritime gateways have developed and have been contributing in the socio-economic development of South Asia. Even though air transport has

³⁷ Arvis, J., Mustra, M., Panzer, J., Ojala, L. and Naula, T. (2007) Connecting to Compete: Trade logistics in the global economy, World Bank: Washington.

³⁸ International Union of Railways data

also seen large growth over several decades, South Asia lags behind many other regions in terms of its usage of air travel. Connectivity between the regional centres, especially the capital cities in terms of direct flights is still very low and many capitals are not directly connected.

Improving regional transport infrastructure has been identified as a critical medium-term driver of peace and economic cooperation for South Asia³⁹, in particular investment within South Asia through joint venture projects:

- Facilitate joint private sector projects to build a network of motorways and railways to international quality standards throughout South Asia. These modern road and rail networks would connect all the major commercial centres, towns, and cities of SAARC countries with each other and with the economies of Central Asia, West Asia, and East Asia.
- Facilitate regional and global joint venture projects to develop new ports along both the western and eastern seaboard of South Asia, and at the same time upgrade existing ports to the highest international standards.
- Facilitate regional investment projects to build a network of airports, together with cold storage facilities and warehouses, which could stimulate not only tourism but also the export of perishable commodities such as milk, meat, fish, fruits, and vegetables.

At a national level, the scale of transport related challenges are also evident, in particular due to rapidly increasing motorisation and private vehicle ownership, and simultaneously, reducing use of public transport and weak public investment. Transport infrastructure has been failing to match vehicle growth, while inefficient, highly polluting vehicles remain widespread. Road safety is also poor, with South Asia experiencing very high levels of road fatalities.

In Pakistan⁴⁰, in 1991-92 the total number of vehicles on roads was 2,095,500 and by 2006-07 the number had reached 8,063,6000, a 285% increase. During the same time period there was 52% increase in the road length. In 1992, Pakistan's National Conservation Strategy Report identified that the average vehicle in Pakistan emits 20 times more hydrocarbons, 25 times as much carbon monoxide and 3.6 times as much nitrous oxide as a vehicle in the United States, which account for 90% of pollutants.

Table 21: Total Vehicle Population (million, 2003 - 2013 July) in Sri Lanka (Source: Sri Lankan Department of Motor Traffic)

Class of Vehicle	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013 end July
Motor Cars	275	294	311	339	361	381	387	410	468	500	514
Motor Tricycle	169	213	254	319	362	407	444	530	668	767	818
Motor Cycles	1,010	1,135	1,266	1,422	1,605	1,761	1,896	2,101	2,354	2,546	2,642
Buses	70	72	74	77	80	81	82	84	89	92	93
Dual purpose vehicles	163	174	181	188	193	196	198	209	243	280	295
Lorries	199	209	224	244	263	277	285	297	312	324	327
Land vehicles- Tractors	154	165	181	200	221	246	260	277	297	316	322
Land vehicles- Trailers	34	35	37	39	41	43	44	46	50	53	55
Total	2,074	2,298	2,527	2,828	3,126	3,391	3,595	3,954	4,480	4,877	5,066

In a similar vein, Sri Lanka has also experienced a rapid increase in the total vehicle ownership, as shown in Table 21. Between 2003 and 2013, the total number of vehicles in Sri Lanka increased from under 2.1 million to over 5 million. This increase corresponds with a population change in that period running at a 0.8% annual change.

Three of the countries also have over half of their total roads unpaved. These include Afghanistan (70.7%), Bangladesh (90.5%) and Bhutan (59.6%).

Road safety is also a major concern. According to the World Health Organisation (WHO), road traffic accidents kill more people around the world than malaria, and are the leading cause of death for young people aged five to 29 – especially in developing countries. While low and middle-income countries are home to less than 50% of the world's registered vehicles, 90% of the world's road traffic deaths occur in developing countries. When looking at recorded road deaths proportional to

³⁹ Sadiq Ahmed, Saman Kelegama and Ejaz Ghani (Editors) (2010) Promoting Economic Cooperation in South Asia. World Bank, Sage Publications.

⁴⁰ Pakistan National Transport Research Centre (NTRC)

a country's population, the Cook Islands comes out on top (45.0 road deaths per 100,000 people), followed by Libya (34.7), South Africa (33.2) and Iran (32.2). However, much of South Asia also suffers from very high levels of road deaths proportional to the population (Table 22).

Table 22: Road deaths proportional to a country's population (World Health Organisation, 2011)

	Road deaths per 100,000 (reported)	Road deaths per 100,000 (adjusted / estimated by WHO report) ⁴¹
Afghanistan	6.6	39.0
Bangladesh	2.6	12.6
Bhutan	16.9	14.4
Maldives	3.3	18.3
Nepal	3.4	15.1
Pakistan	4.4	25.3
Sri Lanka	12.1	13.5

National priorities

The national priorities for smart, green and integrated transport are summarised in Table 23. These have been extracted from each country's national position paper, which also includes further detail on the current status, actions taken by the Government and recommendations.

Table 23: National priorities for smart, green and integrated transport (extracted from national position papers)

Afghanistan⁹

- Development of an integrated transportation strategy to address the development of all modes of transportation
- Improve and upgrade air transport through foreign investment
- Development and expansion of environment friendly means of transport to minimize environmental impacts
- Development of the traffic management system and awareness of people about traffic regulations in major cities to reduce congestion and enhance mobility
- Increased private sector involvement and enhanced coordination between line ministries on transport related issues

Bangladesh¹⁰

- Given the scarcity of resources, it is crucial to prioritise a strategy for ensuring the maximum efficiency in using the existing transport network facilities
- A better traffic control system, fuel free technology, solar and bio energy, and the inclusion of battery operated vehicles could be the solution to many problems
- Increasing the number of battery operated bikes and reducing the use of fossil fuel operating taxis significantly reduces local transportation costs as well as reducing air and sound pollution
- Transport infrastructure programs such as construction of new roads, freeways, road extensions, and bridges need to be expedited to meet the challenges of the increasing population
- Private transport should be replaced by public transport to improve services and avoid traffic congestion
- Driving license authorities need to be strengthened in that the vehicle drivers are trained properly to minimise traffic accidents
- Given that Bangladesh is a country of rivers and canals, it should improve its water transportation infrastructure so that traffic load on roadways could be reduced

⁴¹ The total fatalities figures comes from the WHO report and are often an adjusted number of road traffic fatalities in order to reflect the different reporting and counting methods among the many countries

Bhutan¹¹

- Explore the potential of clean and green transport like the electric vehicles but with better technology so that the used batteries are not environmental hazards
- Explore the potential of mass rapid transportation system which is green, clean and integrated in the overall transport system

Maldives¹²

- Encourage regional economic development through efficient and affordable transport network
- Facilitate private sector investments to develop transport related infrastructure
- Establish suitable warehouses in the regional capitals
- Encourage use of environmentally friendly, economical vehicles for transportation and with improved safety standards for all types of transport, to establish better links between markets, services and people through efficient transport network
- Achieve a balance shift towards environmentally friendly transport modes to bring about a sustainable transport and mobility to accomplish carbon neutral transport
- Encourage academia to research and understand vulnerabilities and adaptation measures in relation to transport and energy
- Promote research, training and technical development on smart, green and integrated transport

Nepal¹³

- Policy formulation, awareness and subsidy, a workable plan for implementation
- Address the rapid motorization and increasing road congestion in urban areas, especially in the capital city, Kathmandu valley
- The poor condition of public transport services (urban, intercity and rural), and the need to introduce railways for efficient and reliable mobility
- Lack of understanding and policy focus on the importance of an integrated transport system

Pakistan¹⁴

- Road transport requires establishing and developing indigenous engineering tools for the design of roads, including road factor in urban planning and introducing public transport
- Traffic management framework should include educating people about transport use and traffic safety, and enforcing traffic regulations stringently
- Vehicle emission testing stations should be installed and fuel-efficient and environment friendly vehicles should be introduced to mitigate environmental problems
- There is a dire need to restore the railway transport mode, which is out dated presently, through increased investment and involving private sector
- Pakistan International Airlines requires increased investment to enhance the services quality and revive international competitiveness

Sri Lanka¹⁵

- To develop the road network through establishing high mobility inter-regional expressways, capacity enhancement and repair of national highways, and achieving all weather roads on the entire road network
- To achieve 100% rural accessibility and connectivity through the repair of national, provincial and rural roads and rural road upgrading
- To ensure accessible, regular modes of transport to rural areas and in general, improving existing public transport services
- To improve network capacity (via enhancing greater rural to urban movement) and removal of network gridlock through improvement, reconstruction or construction of bridges
- To establish missing safety regulations, supported by strict enforcement and policing

Regional priorities

Key regional priorities for smart, green and integrated transport, include:

Environmentally friendly, green transport: Given the rapid rise in vehicular traffic, a trend that is likely to continue due to population and economic growth, affordable, green private and public transport will be essential to control emissions.

Introduce / improve 'smart' traffic management: With limited financial capacity to expand transport infrastructure, intelligent use of existing capacity will be vital to support growth.

Integrated transport: An integrated and efficient transport network is an essential element of the enabling environment for a globalised economy. Effective integration of the transport system in South Asia could also contribute greatly in enhancing access to remote areas, thereby extending economic development.

Improved safety standards for all transport infrastructure and services: Establish missing safety regulations, supported by strict enforcement and policing. Create awareness among people about road safety and also help developing countries to attract investment from multilateral institutions to improve their accident-prone highways. Priorities also include awareness programmes to influence the behaviour of road users, and improve care and rehabilitation following accidents.

4.5. Climate action, resource efficiency and raw materials

Horizon 2020: Activities in this challenge will help increase European competitiveness, raw materials security and improve wellbeing. At the same time they will assure environmental integrity, resilience and sustainability with the aim of keeping average global warming below 2° C and enabling ecosystems and society to adapt to climate change and other environmental changes.

With a population of 1.43 billion people (including India), one-third of whom live in poverty, South Asia faces the significant challenge of achieving and sustaining rapid economic growth to reduce poverty and attain other Millennium Development Goals while also tackling the threats posed by global climate change. Economic losses in key sectors, such as agriculture, energy, transport, health, water, coastal and marine, and tourism, are expected to be significant, rendering growth targets harder to achieve.

The effects of climate change have already been felt across much of the region. Germanwatch identifies both Bangladesh and Pakistan as two of the top ten countries most affected from 1994 to 2013 (Table 24).

Table 24: Countries most affected from 1994 to 2013, annual averages (Source: Germanwatch Long-Term Climate Risk Index CRI)

CRI 1994–2013 (1993–2012)	Country	CRI score	Death toll	Deaths per 100,000 inhabitants	Total losses in million US\$ PPP	Losses per unit GDP in %	Number of Events (total 1994–2013)
6 (5)	Bangladesh	20.83	749.10	0.54	3128.80	1.20	228
10 (12)	Pakistan	31.50	456.95	0.31	3988.92	0.77	14

A recent report by the Asian Development Bank⁴² warns that the total climate change cost in South Asia will increase over time and will be prohibitively high in the long term. The report indicates that South Asia could lose an equivalent 1.8% of its annual gross domestic product (GDP) by 2050, which will progressively increase to 8.8% by 2100. The model suggests that the Maldives will be hardest hit in GDP loss, while Bangladesh, Bhutan, Nepal, and Sri Lanka are projected to face 2.0%, 1.4%, 2.2%, and 1.2%, respectively, loss of annual GDP by 2050.

The Maldives and Bangladesh are low-lying and are therefore highly exposed to rising sea levels and uneven precipitation, which will take a heavy toll on coastlines and the industries, like fishery or coastal farming that depend on the coasts or are located there like ports. Elsewhere, the losses in Nepal could rise to 9.9 percent – largely because of melting glaciers – while they could total 6.6 percent in Bhutan, and 6.5 percent in Sri Lanka⁴³.

Similarly, Maplecroft's Climate Change Vulnerability Index (CCVI)⁴³ rates 32 countries as having 'extreme risk' to the impacts of climate change over the next 30 years. Among them, Bangladesh is identified at greatest risk, while Nepal, Maldives, Afghanistan and Pakistan also feature in the highest risk category. According to Maplecroft, the countries with the most risk are characterised by high levels of poverty, dense populations, exposure to climate-related events, and their reliance on flood and drought prone agricultural land.

Climate change can affect many aspects of South Asia's production. Energy generation – especially hydropower and thermal – are susceptible. Cyclones and floods can be extremely damaging to infrastructure. The coastal fisheries, forests, salt, minerals, export processing, harbours and airports on the coastal zones are also at risk. Climate change will also increase the costs of production such as water, electricity and land for domestic goods or exports, so no industry or sector is immune.

Livelihoods will become more vulnerable, especially in coastal areas and for industries like farming. Water, energy, and food supplies will become more uncertain and more costly. Changing weather patterns may also bring health impacts. Deaths from dengue and malaria and other water-borne diseases are likely to rise particularly during the monsoon months and extreme weather will force migration as people move to safer, more secure areas of their country.

⁴² Asian Development Bank (2014) Assessing the Costs of Climate Change and Adaptation in South Asia

⁴³ Maplecroft's seventh annual Climate Change and Environmental Risk Atlas (CCERA)

The source of human contributions to climate change and the risks associated with climate change are not evenly distributed. Developed nations typically have high carbon dioxide emissions per capita, while some developing countries lead in the growth rate of carbon dioxide emissions. These uneven contributions to the climate problem are frequently cited at the core of the challenges the world community faces in finding effective and equitable solutions⁴⁴.

Although many South Asian countries are highly vulnerable to the effects of climate change, as low and lower-middle income countries, they tend to have comparatively low CO₂ emissions. Afghanistan, Bangladesh and Nepal's for example, are very low on a per capita basis (Table 25) and on an overall basis.

China, the USA and the EU remain the top-3 emitters of CO₂, accounting for respectively 29%, 15% and 11% of the world's total⁴⁵. After years of a steady decline, the CO₂ emissions of the United States grew by 2.5% in 2013, whereas in the EU emissions continued to decrease by 1.4% in 2013. Per capita CO₂ emissions of China and EU are currently both at a similar level, which is 50% above the global average but still about half the per capita CO₂ of the United States.

Table 25: CO₂ emissions, metric tons per capita (Source: Carbon Dioxide Information Analysis Center, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States)

	2010
Afghanistan	0.3
Bangladesh	0.4
Bhutan	0.7
Maldives	3.3
Nepal	0.1
Pakistan	0.9
Sri Lanka	0.6

However, there are concerns that the world's richest countries are increasingly outsourcing their carbon pollution to China and other rising economies⁴⁵. Outsourcing of emissions comes in the form of cheap clothes and other goods manufactured in China and other rising economies but consumed in the US and Europe. Such concerns, albeit on a smaller scale, are also relevant to much of South Asia, and will become greater as they seek to grow their economies.

National priorities

The national priorities for climate action, resource efficiency and raw materials are summarised in Table 16. These have been extracted from each country's national position paper, which also includes further detail on the current status, actions taken by the Government and recommendations.

⁴⁴ Intergovernmental Panel on Climate Change Fifth Assessment Report (AR5)

⁴⁵ EDGAR JRC report 93171 / PBL report 1490, December 2014

Table 26: National priorities for climate action, resource efficiency and raw materials (extracted from national position papers)

Afghanistan⁹

- Engagement of experts with wider regional and international planning and development bodies to ensure that best practice climate assessments, adaptation approaches and low carbon development strategies developed elsewhere can be applied in Afghanistan
- Establishment of metrological stations in the country which can further help in the development of early warning systems
- Encouraging low carbon growth through use of new technologies
- Integration of national and international environmental standards in development strategies
- Encouraging environmentally friendly innovations in the new private sector, especially industry which can bring the latest technology and a socially responsible business culture to the country
- Stop deforestation, preventing the cutting of green and most valuable agricultural areas from residential and commercial construction, and incorporating a green culture in new cities

Bangladesh¹⁰

- Bangladesh should form a comprehensive climate change adaptation initiative, which may include appropriate land-use planning, conservation biodiversity, community empowerment, and on the whole, the prioritisation of investment in innovative, adaptive and absorptive capacity building activities
- The agriculture sector, being highly vulnerable to climate change, should formulate a comprehensive climate change adaptation plan, including the introduction of climate extremity resistive crops and forming techniques
- As the coastal people are the most vulnerable group due to the potential climate change effect, a resettlement plan for those residents needs to be formulated
- As climate change research is still a grey area among the scientists and development practitioners, it is time to research the development of a method in estimating the loss and damage of climate change

Bhutan¹¹

- Development which takes care of its people without endangering the ecological balance
- Human-wild life conflict
- Implementation of “inclusive, green socio-economic development”

Maldives¹²

- Research on climate change impacts on Maldives ecosystems, technical development,
- Harmonize the coordination and strengthen the integration of sustainable development in economic, social and political development, and ecological integrity
- Establish proper sewage and solid waste disposal systems for all communities across the country
- Establish building codes for constructing climate resilient infrastructure
- Develop a mechanism to ensure that climate change is integrated in all sectors, and ensure that the citizens of the Maldives respect, and preserve the values, culture and traditions of the Maldives
- Incorporate climate change information in the national curriculum
- Foster sustainable development while ensuring security, economic sustainability and sovereignty from the negative consequences of a changing climate

Nepal¹³

- Climate change issues, vulnerability and disaster, adaptation and mitigation
- Resource efficiency, use policy and conservation of resources
- Raw material use and sustainability
- Environment protection and use of resources and technology

Pakistan¹⁴

- Adopting climate change requires increased investment, introducing cost-effective and innovative alternatives
- Improving capacity of governing institutions for regular monitoring of land use, put in place hazards (floods, land sliding) early warning and mitigation systems
- Introduce climate extremity resistive crops and forming techniques
- Mitigating carbon emission through promoting hydropower and renewable energy alternatives
- Reducing air and water pollution through ethical and managed agricultural practices, and safe industrial waste disposal and recycling

Sri Lanka¹⁵

- Increase green cover through forest cover conservation, expansion and watershed management, creation of biodiversity parks in urban areas, and enforcement of laws
- Ensure comprehensive yet integrated policy making to safeguard natural resources and ecosystems, including non-energy and non-agricultural raw materials
- Integration of climate change adaptation to national disaster risk reduction and management policies
- Promote the value of ecosystem services for economic growth and disaster risk reduction through research and computation

Regional priorities

In order to tackle climate change, action is needed on a global level and the global community should continue to work towards agreeing and implementing measures to keep emissions from pushing the temperature rise above 2 degrees⁴⁰. However, emissions in all countries in South Asia are set to rise as they become wealthier, as well as act as major producers for developed economies. All South Asian countries need to think about clean energy, energy efficiency, clean transport and other measures that keep emissions low. Key regional priorities for climate action, resource efficiency and raw materials, include:

Integration of climate change adaptation within national policies and planning: This may include appropriate land-use planning, conservation biodiversity, community empowerment, and investing in innovative, adaptive and absorptive capacity building activities.

Early warning, preparedness and mitigation towards increased resilience: Shift development towards a mindset of resilience and innovation. Much of South Asia is economically poor, socially and politically marginalised and otherwise vulnerable. Resilience building measures must be inclusive. Research activities are needed on the rapid increase of global warming and air pollution in the southern Asian region, encouraging low carbon growth through the use of new technologies, introducing cost-effective and innovative climate change adaptation methodologies, developing disaster management systems through early warning systems, the efficient use of material, waste management and recycling, and encouraging environmentally friendly innovations in the private sector.

Promote the green and blue economy, develop climate resistant crops and promote economically viable ecosystems and services: Economic diversification is not the key response needed. What is needed is for all sectors of the economy to be prepared to withstand climate change. In agriculture, for example, new technologies such as rice cultivation systems with more efficient water and nutrient use should be promoted. Altering planting times, using resistant varieties, and diversifying crops can help.

Management of resources and development of pollution standards and compliance: Countries need to look at better management of resources and services. Better coastal zone management, efforts to protect riverbanks from erosion and building climate-proofed roads, bridges and other infrastructure is needed. In the water sector, groundwater should be protected.

4.6. A changing world - inclusive, innovative and reflective societies

Horizon 2020: Europe faces huge challenges in reducing inequality and social exclusion. 80 million people are at risk of poverty and 14 million young people are not in education, employment or training. We have not yet overcome the economic crisis which has led to unemployment rates of 12% in general and 20% among the youth.

As identified in the introduction (and summarised in Table 1), there is great diversity among the seven South Asian countries considered within this paper, and this extends to culture and ethnicity.

South Asia is ethnically diverse, with more than 2,000 ethnic entities, with populations ranging from hundreds of millions to small tribal groups. South Asia has been invaded and settled by many ethnic groups over the centuries - including various Dravidian, Indo-Iranian, Tibeto-Burman, and Austroasiatic groups. The amalgamation of these various groups has produced composite cultures with many common traditions and beliefs, but the traditions of different ethnic groups in South Asia have diverged throughout earlier times, sometimes giving rise to strong local traditions such as the distinct South Indian and Bengali cultures.

Hinduism, Buddhism, Jainism and Sikhism, four major world religions founded in the region that is today's India, are spread throughout the region. Islam, Judaism, and Christianity also have significant region-specific histories. While 80% of Indians are Hindus and Nepal is a Hindu-majority State, Sri Lanka and Bhutan have a majority of Buddhists. Islam is the predominant religion of Pakistan and some of Bangladesh. It also is the majority religion in Afghanistan, with a very small minority nowadays left to be professing Sikhism and Hinduism.

Conflict has featured prominently in the region. Afghanistan has been in a protracted state of conflict, with partial destruction of core institutions. The Soviet–Afghan War lasted over nine years from December 1979 to February 1989. More recently, the United States invaded the country after the September 11 attacks, supported initially by close allies, and eventually by the wider North Atlantic Treaty Organization, beginning in 2003. Pakistan's governance is one of the most conflicted in the region. The military rule and the unstable government in Pakistan has become a concern for the South Asian region. In Nepal, the governance has struggled to come in the side of democracy and it only showed signs in the recent past to support the democratic system. The political situation in Sri Lanka has been dominated by an increasingly assertive Sinhalese nationalism, and the emergence of a Tamil separatist movement under LTTE, which was suppressed in May 2009.

The Worldwide Governance Indicators (WGI) suggest that South Asia has significant shortcomings in governance (Figure 2). The WGI show the quality of governance provided by a large number of enterprise, citizen and expert survey respondents. These data are gathered from a number of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms.

Similarly, the Corruption Perceptions Index (Figure 3) ranks countries and territories based on how corrupt their public sector is perceived to be. A country or territory's score indicates the perceived level of public sector corruption on a scale of 0 (highly corrupt) to 100 (very clean). A country or territory's rank indicates its position relative to the other countries and territories in the index. The 2014 index includes 175 countries and territories. Nepal and Pakistan (joint 126th), Bangladesh (145th) and Afghanistan (172nd) all score badly and are among the lowest ranked in the World.

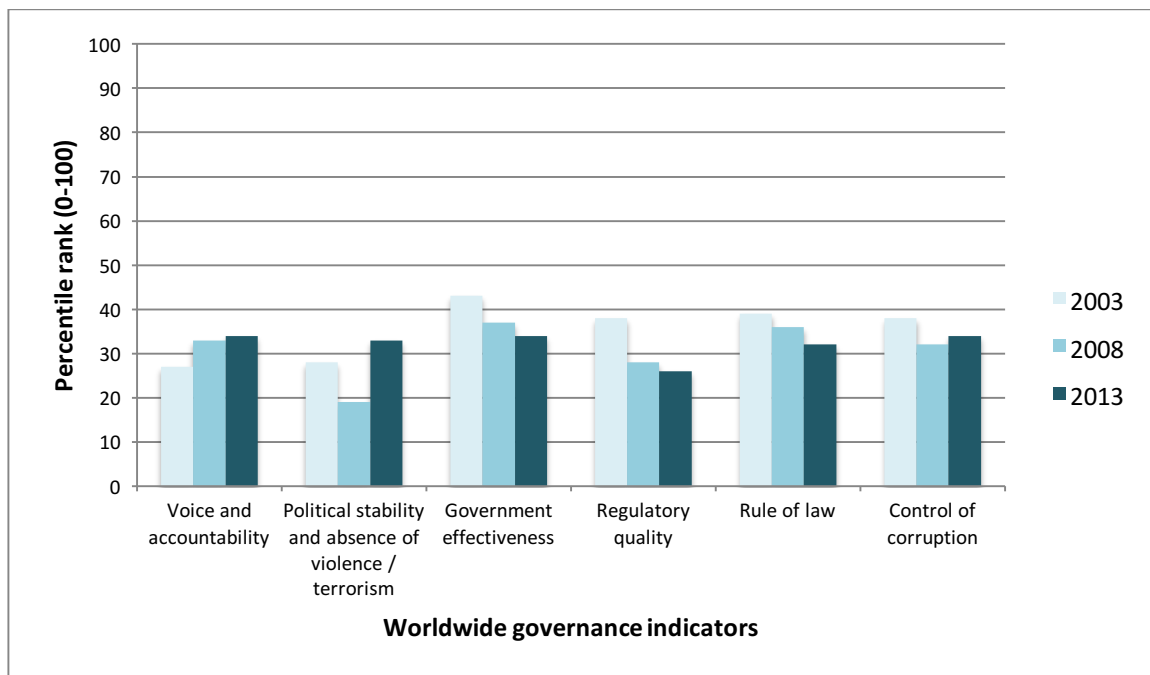


Figure 2: Governance indicators for South Asia (Source www.govindicators.org)

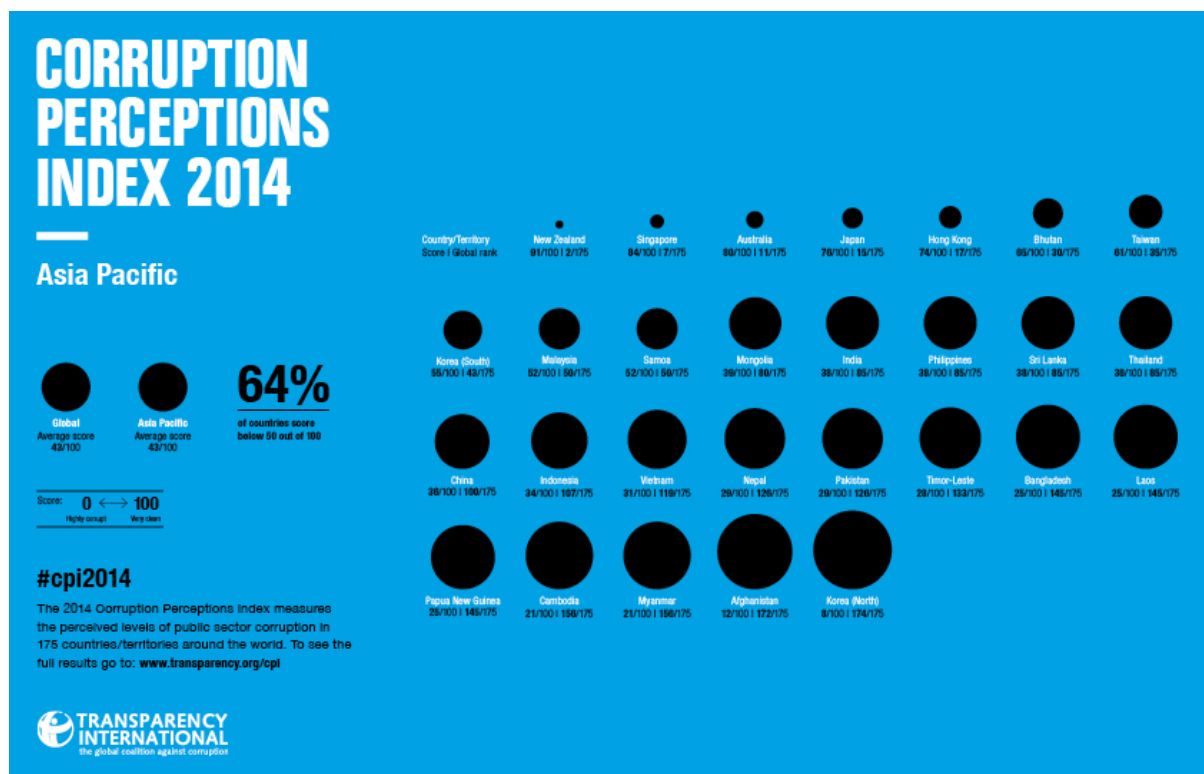


Figure 3: Corruption Perceptions Index (Source: Transparency International)

Employment and labour markets are also a concern. In South Asia, many enterprises are created and operate in the unorganised sector, forcing people into an economic space that isn't taxed, regulated or monitored. This sector is also associated with high poverty rates, poor job security, and gender discrimination. Unemployment is also a problem (Table 27), in particular Afghanistan and Nepal, which both also suffer from very poor job security.

Table 27: Unemployment rates (Source: International Labour Organisation)

	Unemployment rate % ⁴⁶
Afghanistan	35 (2008)
Bangladesh	5 (2012)
Bhutan	2.1 (2013)
Maldives	11.6 (2013)
Nepal	46 (2008)
Pakistan	6.6 (2014)
Sri Lanka	4.2 (2012)

South Asia as a region is home to the largest proportion of unemployed and inactive youth in the developing world: 31%⁴⁸. Many attribute this to social norms, as many South Asian women do not work for cultural reasons. But with a growing middle class, gender norms are rapidly evolving. Employment laws are often viewed as too restrictive, compliance too complicated, and enforcement too weak. For example, large businesses often need prior government approval for dismissals, and severance pay is very high in Sri Lanka, Bangladesh, Nepal, and Pakistan.

Despite this, regulation often fails to protect workers as formal employment regulation covers less than 10% of the labour force in most countries, and less than a third even in Sri Lanka, which has the most formalised labour market in South Asia⁴⁷.

The economic and social costs of prolonged unemployment can remain for decades. Individuals who begin their careers without work are more likely to earn lower wages over the course of their lifetimes. The loss in human capital from lost training and experience accumulation can stunt the productivity of an entire generation.

Within South Asia, gender inequality remains a major barrier to human development. Girls and women have made major strides in several countries, but they have not yet gained gender equity. The disadvantages facing women and girls are a major source of inequality. All too often, women and girls are discriminated against in health, education, political representation, and labour market — with negative repercussions for development of their capabilities and their freedom of choice. The Gender Inequality Index is a composite measure reflecting inequality in achievement between women and men in three dimensions: reproductive health, empowerment and the labour market. As shown in Table 28, only Sri Lanka (73rd) is ranked in the top 100 globally.

Literacy rates also remain a concern in several countries. While Sri Lanka has a literacy rate of 91% for people aged 15 and above, Afghanistan (55%), Bangladesh (59%), Nepal (57%) and Pakistan (55%)⁴⁸ all have large portions of the population that remains illiterate. Those who cannot read and write are “destined to be on the social and economic margins of our world,” UNESCO⁴⁹ reminds us. Being able to read and write has profound benefits not only on a person's educational opportunities but also for their health, economic prospects and their children.

⁴⁶ International Labour Organisation

⁴⁷ OECD (2012) Policy Priorities for International Trade and Jobs

⁴⁸ UNESCO Institute for Statistics

⁴⁹ <http://www.unesco.org/new/unesco/events/prizes-and-celebrations/celebrations/international-days/literacy-day>

Table 28: Gender inequality index (Source: UNDP Human Development Reports)

HDI rank	Country	Gender Inequality Index Value, 2013	Gender Inequality Index Rank, 2013	Maternal mortality ratio, 2010	Adolescent birth rate, 2010/2015	Share of seats in parliament, 2013	Population with at least some secondary education, 25 +, female, 2005-2012	Population with at least some secondary education, 25 +, male, 2005-2012	Participation rate, 15+, female, 2012	Participation rate, 15+, male, 2012
73	Sri Lanka	0.383	75	35	16.9	5.8	72.7	75.5	35.0	76.4
103	Maldives	0.283	49	60	4.2	6.5	13.3	16.6	55.9	77.1
136	Bhutan	0.495	102	180	40.9	6.9	34.0	34.5	66.4	76.9
142	Bangladesh	0.529	115	240	80.6	19.7	30.8 e	39.3	57.3	84.1
145	Nepal	0.479	98	170	73.7	33.2	17.9 e	39.9	54.3	63.2
146	Pakistan	0.563	127	260	27.3	19.7	19.3	46.1	24.4	82.9
169	Afghanistan	0.705	149	460	86.8	27.6	5.8	34.0	15.7	79.7

National priorities

The national priorities for a changing world – inclusive, innovative and reflective societies, are summarised in Table 29. These have been extracted from each country's national position paper, which also includes further detail on the current status, actions taken by the Government and recommendations.

Table 29: National priorities for a changing world – inclusive, innovative and reflective societies (extracted form national position papers)

Afghanistan⁹

- Reform and update the education system so a new generation of professionals can have political, social and economic leadership of the country without reliance on international assistance
- Strengthen relationships with foreign universities to exchange lecturers and students
- A major problem is the lack of research and evidence based policies, which should be given due priority
- Engage people in social, religious and development activities
- Engage women in community development councils to reflect their voices and needs

Bangladesh¹⁰

- Government should develop a plan for reducing poverty, redistribution and proper utilization of resources, skilled man power development, facilitating leadership practice, increasing innovation and social entrepreneurship
- For improving accountability and transparency in social institutions, people need to engage in social networks in their daily life
- The government should provide incentives to generate more social capital that would lead to having a more inclusive, innovative and reflective society

Bhutan¹¹

- The eroding culture and tradition presents a challenge to progress without breaking down the social fabric and the community vitality of the society
- Redefining both education and development to ensure that moral fabric of the society does not break down and the society is fully imbued with positive values

Maldives¹²

- Reduce vulnerability and poverty through human development and wider employment opportunities
- Achieve development beyond pre-tsunami levels through rapid recovery and reconstruction
- Promote good governance through strengthening legal, administrative and political institutions, and civil society
- Promote sustainable and equitable economic and social development through economic diversification and promotion of corporate social responsibility
- Ensure that the values of the society are consistent with global sustainable developments and other international commitments
- Create an entrepreneurial culture amongst young people
- Promote healthy and responsible lifestyles amongst youth towards creating youth of high moral standard
- Conduct programs to building people's skills and capacities, especially those of young people to shape their character

Nepal¹³

- There is a traditionally well-entrenched, exclusionary, non-innovative and non-reflective state structure, practice and culture
- There is a resistance among existing dominant political leaders towards social transformation, which would lead to inclusive, innovative and reflective societies
- There are significant beneficiaries of exclusionary, non-innovative and non-reflective societies

Pakistan¹⁴

- Improving governance system in the country
- Developing and promoting education and research environments in Pakistan
- Developing sports and tourism opportunities
- Conservation the cultural and religious heritage

Sri Lanka¹⁵

- Need for more bottom-up approaches in policy making, allowing the policies to be better informed by practice and incorporating indigenous values and knowledge into policies
- Promoting gender inclusivity by empowering women and allocating greater decision-making capacity and authority
- Upgrading human capital through science and technology education
- Making ICT more accessible, for example by further reducing costs and making content available in both Sinhala and Tamil languages
- Developing a common platform enabling information / knowledge sharing between different parties

Regional priorities

Key regional priorities for a changing world – inclusive, innovative and reflective societies, include:

Improve transparency and accountability towards good governance: Good governance depends on an ability to exercise power, and to make good decisions over time, across a spectrum of economic, social, environmental and other areas. This is linked with the government's capacity for knowledge, mediation, resource allocation, implementation and maintenance of key relationships. Key factors for the development of better governance and transparency in South Asia include: technical and managerial competence; organisational capacity, reliability, predictability and the rule of law; accountability; transparency and open information systems; participation.

Greater inclusivity and improved social harmonisation among diverse populations: Including participation of women and youth, and consideration of the vulnerable, internationalisation, and employment. Labour market policies are also in need of reform. There is a need to move from protecting "jobs" to protecting "workers". Public works in countries like Bangladesh have been around for decades, but have lacked an explicit youth component. Employment programmes can directly produce jobs, in addition to spreading good labour practices and growing markets. Social protection for first-time job seekers, including unemployment assistance and employment guarantee schemes are also needed to protect the most vulnerable.

Cooperation in education system reform: Introducing modern teaching technologies, updating curricula and education system management, and strengthening relationships with foreign universities to exchange lecturers and students. Conducting studies on how to strengthen commercial connections to regional and global economies, and research activities to gather accurate data on the labour market to provide research- and evidence-based policies, and strengthen the governance system.

4.7. Secure societies - protecting freedom and security of the country and its citizens

Horizon 2020: This challenge is about undertaking the research and innovation activities needed to protect our citizens, society and economy as well as our infrastructures and services, our prosperity, political stability and wellbeing.

Populations throughout South Asia face a range of natural hazards, including earthquakes, cyclones, floods, landslides, droughts, and tsunamis. Demographic changes, rapid urbanization, environmental degradation, and climate change have increased exposure to natural hazards, often resulting in more natural disasters and compounding the impact of civil conflicts and other complex emergencies. In addition, declining socio-economic conditions of some populations are increasing vulnerability to hazards in the region.

As described in Section 4.5, and emphasised in the Inter-Governmental Panel on Climate Change reports that have emerged over recent years, the frequency and intensity of regular hazards such as tropical storms, floods and droughts have already significantly increased as a result of climate change. The impacts of such climatic variability are being felt most in developing countries, including those in South Asia. Climate and weather-related disasters already affect croplands, livestock, homes and assets, food security and access to services, transport. Rapid sea level rise could overwhelm the Maldives and submerge coastal areas in Sri Lanka and Bangladesh. Glacial Lake Outburst Floods (GLOF) in the Himalayan region caused by melt- water breaching glacial barriers that protect highland lakes and retreating glaciers pose further far-reaching challenges.

South Asian countries feature prominently in the 2014 ranking of countries most at risk by natural disaster, as measured in the World Risk Index, calculated by the United Nations University. Risk is at its highest where a high level of exposure to natural hazards coincides with very vulnerable societies. Bangladesh ranks 168th, Afghanistan 134th, Sri Lanka 113th, and Pakistan 101st of the 172 countries measured (where 1st is at least risk and 172nd is at most risk).

Between 1980 and 2014, South Asia experienced 1,391 natural disasters that met the criteria of EMDAT⁵⁰. The number of occurrences grew from 265 in the first decade of that period (1980 – 1989) to 470 over the last 10 years (2005 – 2014). These events have cumulatively affected over 2 billion people and have caused over 580,000 deaths. Direct economic losses recorded over this time period amount to over US\$149 billion, a figure that does not account for substantial indirect losses. In particular, high-impact single events have caused massive damage.

The increase in reported disasters is driven, in large part, by a greater number of hydro- meteorological events. While the number of seismic events has remained relatively steady over the past 40 years, flood and storm events have become increasingly common despite relatively consistent rainfall patterns. The growth in the number of hydro-meteorological events is driven by the region's limited capacity to manage high rainfall and storm events and an increased concentration of assets in high risk areas. Combined, this results in a greater number of disasters and higher economic losses. South Asia is the most exposed region in the world to flooding and highly exposed to cyclones.

Several cities in South Asia have been highlighted as very high risk. Every year, settlements in Kathmandu valley experience floods and landslides but Kathmandu itself is at greatest risk due to high exposure to being in an area of high seismicity, but also poor building standards. The devastating earthquake that hit Nepal in 2015 had been widely predicted.

Almost 30% of the 14 million people in Dhaka live in slums along the water's edge, exposing them to flooding. The Stanford-based earthquake disaster risk index also lists Dhaka as one of the 20 most vulnerable cities in the world to earthquakes.

Cities in Pakistan (2005 Kashmir earthquake) and Sri Lanka (2004 Indian Ocean Tsunami) have also been severely affected by major disasters in recent years.

South Asia also features prominently in the 2014 Global Terrorism Index (GTI)⁵¹, an attempt to systematically rank the nations of the world according to terrorist activity. The index combines a number of factors associated with terrorist attacks to build an explicit picture of the impact of terrorism over a 10-year period, illustrating trends, and providing a data series for analysis by researchers and policymakers (where 1st is associated with the highest level of terrorist activity and 162nd is associated with the lowest level). Afghanistan is ranked 2nd (9.39) and Pakistan 3rd (9.37). Only Iraq is ranked above (1st, 12.0). Bangladesh is 24th (5.25), Nepal is 25th (5.23) and Sri Lanka is 37th (4.01).

⁵⁰ EM-DAT: The OFDA/CRED International Disaster Database) (<http://www.em-dat.net>).

⁵¹ Product of Institute for Economics and Peace (IEP) and is based on data from the Global Terrorism Database (GTD)

Alongside natural hazards and terrorism, digital security has also been highlighted as a major concern within many South Asian countries. Specific concerns were raised by respondents concerning security-by-design, privacy, access control, and risk management and assurance models.

National priorities

The national priorities for secure societies – protecting freedom and security of the country and its citizens, are summarised in Table 30. These have been extracted from each country's national position paper, which also includes further detail on the current status, actions taken by the Government and recommendations.

Table 30: National priorities for secure societies – protecting freedom and security of the country and its citizens (extracted from national position papers)

Afghanistan⁹

- Accelerate peace talks and the peace building process with anti-government armed parties
- Developing regional security agreements to secure out-border threats
- Strengthen border management with high-tech protection tools and introducing E-governance
- Cooperation between government, private sectors and international community to build an effective proactive capacity in the country for disaster management
- Developing useful information and data analysis capacity with the equipped early warning systems to enable authorities to make pro-active plans
- A meaningful combat against corruption by growing the culture of responsibility, accountability and rule of law

Bangladesh¹⁰

- Monitoring efforts through policies, proper implementation, maintenance and coordination among the government and other relevant agencies
- Strengthening counter trafficking committees in districts, upazila and union levels to stop human-trafficking
- Tightening the border security so that international terrorist agencies cannot use the land of Bangladesh
- Promoting gender equality, women empowerment, legal protection through panels to ensure women and children are secure
- Developing and strengthening the disaster risk management framework to secure resilient societies and ensure environmental security

Bhutan¹¹

- Mitigation measures of natural disasters like earthquakes, cyclone and outburst of glacial floods
- The geographical location of the country between two big Asian giants poses a challenge to use soft power leverage the buffer status

Maldives¹²

- Ensure through legislative means the protections of national sovereignty, and make Maldivian society one in which the rule of law exists effectively, crime rates are low, country is safe and drug-free and people care about one another
- Promote research, training and technical development in security and civic education to remove corruption and political influences in policing and judicial processes and to create equity among the citizens
- Promote regionalization with improved access to housing, health care, and enhanced well-being
- Change building codes and strengthen the forecasting and disaster preparedness
- Make the infrastructure of the country more resilient to the impacts of climate change
- Improve the capacity to respond to threats to the sovereignty and independence of the Maldives, which in advance will pave way for the security of our neighbouring countries and EU

Nepal¹³

- Gender discrimination and violence against women and children
- Human trafficking
- Youth unemployment and migration
- Poverty
- Illegal availability and use of small arms
- Cyber crime

Pakistan¹⁴

- Priorities included ensuring individual and community's security i.e. basic needs, rights and freedom and environmental protection in the country
- Terrorism and crime control requires civil registration of all Pakistani citizens, establishing crime control centres, shifting towards E-governance and secure documents record
- The country should ensure minimum essential opportunities to ensure economic and personal security
- Gender equality, women empowerment, legal protection through panel to ensure women and children security
- Developing and strengthening disaster risk management framework to secure resilient societies and ensure environmental security

Sri Lanka¹⁵

- Restoration of independent institutions and creation of law and order by removing corruption and political influences in policing and judicial processes
- Removing the state control of media and implementation of right to information
- Capacity improvements to improve the accuracy of disaster forecasting, and to make the infrastructure of the country more resilient through the use of appropriate designs, correct use of materials, and site selection

Regional priorities

Key regional priorities for secure societies – protecting freedom and security of the country and its citizens, include:

Disaster risk reduction, including related information systems: In accordance with the new Sendai Framework (2015-2030), there is a need for South Asia to 'prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience'. Priorities include a shift from disaster loss to disaster risk and from disaster management to disaster risk management. A focus on a people-centred preventive approach to risk reduction will be vital, as will defining the primary responsibility of States for risk reduction, but also shared responsibility with stakeholders. The scope of such measures must include slow-onset, man-made and biohazards.

Border security, crime, and surveillance: Fighting crime and terrorism will require new technologies and capabilities for fighting and preventing crime (including cyber-crime), illegal trafficking and terrorism (including cyber-terrorism), including understanding and tackling terrorist ideas and beliefs to also avoid aviation-related threats. The EU's external security policies in civilian tasks, ranging from civil protection to humanitarian relief, border management or peace-keeping and post-crisis stabilisation, including conflict prevention, peace-building and mediation, will also be invaluable in the region. Other priorities include collaboration in the field of smart technologies for civil registration, to strengthen border management with high-tech protection tools and introducing e-governance.

4.8. Cross cutting regional priorities

In addition to the priorities identified under each thematic challenge, there were several recurring, cross cutting priorities. These are summarised below:

Development and financing of infrastructure: Adequate physical infrastructure is a key element of economic growth. However, the developing world needs far more financing for infrastructure than can be provided through overseas development aid and domestic public finances alone. The cost of maintaining existing infrastructure and undertaking necessary extensions of its coverage is estimated at 7 per cent of developing country GDP, equivalent to about 600 billion US dollars (USD) per year. Public spending on infrastructure in developing countries is presently around 3 per cent⁵². Given the shortage of public funds in most developing countries, one solution is to invite greater private sector participation and expand the use of public-private partnerships (PPP).

Adopt an evidence-based approach to policy: The national position papers identified that most of the seven countries under consideration had developed policies aimed towards the thematic areas in Horizon 2020. However, the quality of the policymaking, as well as policy implementation and evaluation, was frequently questioned. Evidence based policy can have an even more significant impact in developing countries. Evidence based policy is a discourse or set of methods which informs the policy process, rather than aiming to directly affect the eventual goals of the policy. It advocates a more rational, rigorous and systematic approach. The pursuit of evidence based policy is based on the premise that policy decisions should be better informed by available evidence and should include rational analysis. This is because policy which is based on systematic evidence is seen to produce better outcomes. The approach has also come to incorporate evidence-based practices. Evidence based policy tends to be less well established in developing countries than in developed ones, and therefore the potential for change is greater. Better utilisation of evidence in policy and practice can help save lives, reduce poverty and improve development performance in developing countries.

Capacity building and sustainable development: International cooperation and collaborations will be essential to address and tackle common global societal challenges, and the need for cooperation towards capacity development was frequently identified at the national level within South Asia.

The concept of capacity building or capacity development appeared in the late 1980s and became deeply entrenched within the development agenda in the 1990s. Rather than representing a new idea, it reflected growing criticism of many development assistance programmes. In contrast to this extraneous approach, it emphasised the need to build development on indigenous resources, ownership and leadership and by bringing human resources development to the fore. The concept of capacity development was therefore a move away from ‘aid’ or ‘assistance’ towards a ‘help yourself’ approach that was designed to prevent a dependency on aid emerging. Capacity development is based on learning and acquisition of skills and resources among individuals and organisations. While this process may rely on some imported resources, external capacity is seen as a knowledge-sharing device, which allows the strengthening and developing of the local capacity. As such, it relates closely to some definitions of resilience, which stress the objective is to build resilience by maximising the capacity to adapt to complex situations, and whereby resilience describes an active process of self-righting, learned resourcefulness and growth.

Capacity development is committed to sustainable development, to a long rather than short term perspective, and attempts to overcome the shortcomings of traditional donor-led projects that have been prevalent in many development projects — typically criticised for being too short term rather than sustainable, and not always addressing the needs of the recipients. Development within a capacity building context allows communities and countries to identify their own needs, and design and implement the best strategy within the local context. As a process, it builds on monitoring and evaluation in order to identify existing capacities, deficiencies and the progress and achievements of development.

⁵² World Bank

This regional position paper is an output of the CASCADE project (Collaborative Action towards Societal Challenges through Awareness, Development, and Education) that aims to provide the foundation for a future International Cooperation Network programme targeting South Asian Countries, which will promote bi-regional coordination of Science & Technology cooperation.

The project coincides with the launch of Horizon 2020, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Running from 2014 to 2020 with a budget of just over €80 billion, the EU's new programme for research and innovation is part of the drive to tackle global societal challenges, and create new growth and jobs. International cooperation in research and innovation is an essential element for meeting the objectives of Europe 2020. Recognising the global nature of producing and using knowledge, Horizon 2020 builds on the success of international cooperation in previous framework programmes and is fully open to participation from third countries.

The 18 month CASCADE project set out to:

1. Compile a regional position paper that identifies global challenges and research priorities
2. Map and develop an inventory of national and regional stakeholders related to global challenges
3. Raise awareness on research & innovation priorities for fostering cooperation and towards building mutual understanding on how to address common global societal challenges

Further information about the project can be found at www.cascade-inconet.eu.