

SECTOR ASSESSMENT (SUMMARY): CLIMATE CHANGE

A. Sector Performance, Problems, and Opportunities

1. **Impacts to date.** Tonga is already being affected by climate change, with major environmental, economic, and social consequences likely to be more severe in future. Particular concerns include impacts on agricultural production, water supply, coastal infrastructure and resources. The effects of climate change are exacerbating natural hazards such as tsunamis, cyclones, coastal flooding, and droughts. Over the last few decades, Tonga observed a higher variability of rainfall causing localized flooding as well as droughts related to El Niño events. In the next 50 years, Tonga has a 50% chance of experiencing loss exceeding \$175 million and casualties larger than 440 people due to natural hazards.¹ Air temperature in Tonga is expected to continue to increase. An increase of <1°C is projected by 2030, with increases of up to 2.5°C are projected by 2090. The intensity and frequency of extreme hot days is also projected to increase.² Increases in mean sea levels are expected to continue and climate change is also expected to have a significant effect on the return periods of extreme high sea levels that persist for at least an hour and which can cause coastal flooding, accelerated coastal erosion and saline intrusion into groundwater. The National Infrastructure Investment Plan (NIIP 2013–2023)³ records that with a sea level rise of 0.3m (a scenario in the middle of the projected range), 14% of the population and nearly 4% of the land area of Tongatapu could be inundated.

2. The sea-level rise near Tonga measured by satellite altimeters since 1993 is over 6 mm per year, larger than the global average of 3.2 ± 0.4 mm per year. This rise is partly linked to a pattern related to climate variability from year to year and decade to decade. A projected rise in sea level of 5-15 cm is expected by 2030, and 20-60cm by 2090. But sea level rise may be higher as this does not take into account ice sheet disintegration processes which will have a major impact on global sea levels. There are also signs that some land areas are sinking which will increase the subjective sea level rise. New software and technology tested in 2010 found that "The Tonga tidal station shows a 9.21 mm sea-level rise a year, whilst satellite data records indicate a rise of 6.29 mm a year. This has led to the conclusion that the area around the tidal station is sinking at a rate of 2.92 mm per year. Projections generated under a high climate sensitivity scenario and worse case story line for global greenhouse gas emissions show a possible sea-level rise of 952 mm for Tongatapu by the year 2100."⁴

3. **Impacted Sectors and Threats.** As part of the recent Tonga NIIP, a qualitative rapid risk assessment (RRA) was undertaken. It indicates that in the short-term, cyclones and storm surge are potentially the most damaging climate manifestations across all economic infrastructure sectors. The short term risks are greatest in the coastal sector, with destruction of critical coastal infrastructure such as schools, roads, health centres and properties, the energy and ports sectors, with fuel storage facilities, overhead transmission lines, and outer island ports infrastructure particularly at risk. In the long-term, changes in precipitation and temperature as well as an increase in intensity of tropical cyclones combined with increase in sea levels are potentially the most damaging climate manifestations. Associated long term risks in this context cuts across all socio-economic sectors through, increased rainfall intensity, agricultural and hydrological droughts, limited access to safe drinking water, increased incidents of water and

¹ Country Risk Profile: Tonga produced under the Pacific catastrophe risk assessment and financing initiative supported by World Bank and ADB (TA 6496-REG), September 2011.

² Pacific Climate Change Science Program (PCCSP) reported in Tonga NIIP (NIIP) 2013 – 2023 Annex D. The Pacific Region Infrastructure Facility (PRIF) 2013.

³ The first NIIP was produced in 2010. The second plan (NIIP2) covers the period 2013–2023.

⁴ Tonga country report - Climate Change in the Pacific: Scientific Assessment and New Research | Volume 2: Country Reports

vector borne diseases, and a reduction in valuable ecosystem functions such as marine habitats. The relatively gradual and predictable nature of this climate manifestation will allow the severity of impacts to be progressively managed through proposed targeted investments in climate resilient infrastructure, capacity building and small scale financing.

4. **Economic Impacts.** In the case of small island states, such as Tonga, a single disaster event can cause a debilitating shock to a national economy. The World Bank estimates the economic cost of disasters in Pacific Island Countries at between 2-7 per cent of GDP per annum. This rises to an average of 46 per cent of GDP during disaster years. It is predicted that the cost of a 1-in-100-year cyclone in any of the capital cities of Fiji, Solomon Islands, Vanuatu, Samoa or Tonga would result in potential economic losses of up to 60 per cent of GDP. In the 1990s the cost of extreme events in the Pacific Island region is estimated to have exceeded US\$1 billion. This includes the cost of Cyclones Ofa and Val, which hit Samoa in 1990/91, causing losses of US\$440 million (greater than the country's average annual GDP). In Niue, Cyclone Heta is estimated to have caused an impact of about NZ\$37.7 million, approximately 25% of its GDP.⁵

3. **Options.** The (not mutually exclusive) options for both governments and individuals with regard to future adaptation are to: continue current activities with climate change adaptation options being limited to incremental improvements in current systems of water supply, coastal protection and accessibility with pilot interventions in alternative livelihoods (short-term, minor and incremental); accept changes in livelihoods to adapt to changing circumstances, design and construct more robust infrastructure including water supply and coastal protection: and individual house improvements to better adapt to climate change (medium-term, major and evolutionary); and relocate some properties and infrastructure to locations which can be better protected from increasing climate change impacts, but make use of opportunities created through a retreating coastline or maintenance of coastal protection devices (long-term, strategic and re-locational).

4. **Investment Opportunities.** Due to the high level of climate and natural disaster vulnerability of Pacific countries, the region has been a focus of Climate Change Adaptation (CCA) and Disaster Risk Management (DRM) support from a wide range of donors (the latest list of relevant ongoing/recently completed projects is included in Link document 5: Development Coordination. The majority of this support has been in technical assistance (TA), i.e. policy development, capacity building, and institutional reform or community level adaptation work. Given the multi-sector nature of climate change there are a wide range of often overlapping or marginal proposals which need to be better coordinated by the government and focused onto addressing the country's needs. The NIIP is the starting point for identifying which projects are government priorities according to individual infrastructure sectors. Annex D of the NIIP identifies and analyses potential projects from a CCA and DRM aspect and these were endorsed by the Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management-Technical Working Group (JNAP-TWG)⁶. The Strategic Program for Climate Resilience (SPCR) used this list to develop the sub-project selection criteria for its identification of potential climate proofing infrastructure projects.

5. Tonga's GDP in 2013 (Tonga Statistics Department) was T\$799.3 million (US\$458 million) and is dominated by the services sector (62.5%) with agriculture and industry

⁵ Dr Alison J Baker, GHD and Dr David Week, Assai Consult. October 2011. Infrastructure and Climate Change in the Pacific. AusAID, Commonwealth of Australia 2012

⁶ JNAP-TWG membership is comprised of high level technical representatives of all relevant climate change line ministries. They were established by cabinet in 2010 under the auspices of MLECCNR to coordinate, inform and monitor all CCA & DRM initiatives and progress.

contributing 20.9% and 16.6% respectively. However, the latest survey (2001) reported by the Tonga Department of Statistics, stated that 64.2% of households were agriculturally active, which shows its importance, especially on the outer islands where the figure exceeded 80%. It is the opinion of the Tongan stakeholders of this project that climate change is likely to have substantial and widespread impacts. Among these impacts that have started to show are losses of coastal infrastructure and coastal erosion resulting from cyclones and sea level rise. It was also felt that climate change could cause more intense cyclones and droughts resulting in crop failures. In the Tongatapu household survey,⁷ an overwhelming 91% of respondents indicated that they personally observed climate change impacts. Of those that did, 65% thought this was reflected by unusual seasons, while 40% reported higher rainfall. In terms of crop production, 60% reported smaller crop yields, 29% reported more diseases, while 31% of respondents were concerned about large changes in seasons.

B. Government's Sector Strategy

6. The Pilot Program for Climate Resilience (PPCR) is part of the Strategic Climate Fund (SCF), a multi-donor Trust Fund within the Climate Investment Funds (CIF). Tonga was chosen as a pilot country, not only for its high level of vulnerability to climate change hazards and risks, but also in that it has been identified as having country preparedness to adopt and implement climate resilient development plans.

7. The Government of Tonga's development aims and program were reviewed and updated in the 2010 Tonga Strategic Development Framework (TSDF) which targets efforts for the next 5–10 years. The TSDF specifically targets infrastructure up to 2020 and the need to integrate environmental sustainability and climate change into all planning and executing of programs. The government has prepared, costed and prioritized infrastructure development plans for Tonga including the NIIP, which will be the basis of government's public sector investment programme for the next decade. A similar document, the Urban Infrastructure Development Plan (UIDP), has been prepared for Nuku'alofa. The high profile nature of both CCA and DRM in Tonga is further strengthened through the TSDF which includes one of its outcome objectives is "cultural awareness, environmental sustainability, CCA and DRM, integrated into all planning and implementation of programmes".

8. Tonga was early to recognise the cross cutting nature of climate change and extreme weather events between sectors and became the first Pacific country to develop a JNAP⁸ as its strategy to address climate and related disaster risk challenges. The plan comprises six goals, each of which has its own specific objectives and outcomes (see list of Link Documents, Supplementary Documents). The publication of the JNAP report led to the establishment of the JNAP-TWG Secretariat⁹. The Secretariat now reviews all corporate plans for each ministry and ensures the inclusion of a strategy to commit the ministries to implement the JNAP for CCA and DRM. Each ministry's annual management plan must also reflect a commitment to the implementation of actions under the JNAP for which they are responsible. This approach effectively commences the process of mainstreaming of CCA and DRM within the planning and budgetary systems of each agency.

⁷ A Household Income and Expenditure Survey was conducted in 2009 and reported by the Statistics Department of Kingdom of Tonga in 2010.

⁸ The JNAP was approved by the Cabinet of Tonga on 28th July, 2010 for the period 2010 - 2015.

⁹ The secretariat is located in the climate change division of the MLECCNR and consists of three (3) individuals who are contracted as consultants through AusAID financing until April 2014. The Secretariat coordinates the JNAP-TWG and also acts on behalf of the ministry to promote appropriate CCA and DRM projects. The head of the Secretariat was also appointed as deputy CEO for the climate change division commencing 1 March 2013.

9. In line with the TSDf, a reshuffle of ministries, intended to streamline government services was undertaken in 2012. This reduced the number of ministries to 14. Among other changes this created the Ministry of Lands, Environment, Climate Change and Natural Resources (MLECCNR) and the Ministry of Infrastructure (MOI) (which includes both the National Emergency Management Office (NEMO) and the Tonga Meteorological Service (TMS). This reshuffle thereby acted to put these two ministries at the forefront in developing and implementing key CCA and DRM initiatives and they are the key implementing agencies (IA) of the proposed project. The formation of the JNAP-TWG and the publication of the NIIP through a coordinated effort have further supported the government's desire to improve integration and efficiency with the limited financial and manpower resources at its disposal.

10. **Planning, policy, and legislation.** The NIIP is an integrated strategy that includes priority investment projects and supporting initiatives (reforms, capacity building, technical assistance, etc) that are required to ensure the effective development of the infrastructure sector. Supporting improvements to the CCA and DRM enabling environment will be indispensable to the effective implementation of the CCA and DRM elements of the priority projects contained in the NIIP. Such activities will target actions in each of the three components of the enabling environment, namely: (i) decision support tools; (ii) governance framework (i.e. institution and capacity building, planning, policy, and legislation); and (iii) financing mechanisms. The NIIP identified the following required tools: i) reinforcement of the meteorological monitoring network; ii) risk modelling and mapping; iii) climate projections for building code and road design standard revision; iv) groundwater capacity analysis and measurement. The project provides TA and resources to provide these tools to the ministries responsible for these areas.

11. **Institutions and capacity building.** The NIIP highlighted the need for the strengthening of CCA and DRM focal points, specially the JNAP Secretariat, TMS, and NEMO in relation to climate change projections, climate and natural disaster risk analysis for infrastructure, and disaster response planning. The aim is that these institutions and personnel have the core competencies in relation to these issues and become sources of information for the rest of government. During the preparation of the NIIP 2013, initial discussions were held between the JNAP secretariat and the NIIP working group to identify future means of collaboration that would facilitate the institutionalisation of CCA and DRM issues in the infrastructure sector. Options for a solid working relationship between these two organisations will continue to be explored by the government.

12. **Finance.** Traditional donors are paying greater attention to the mainstreaming of climate issues in their operations and are providing enhanced support for targeted CCA and DRM activities, either through standalone financing or as an increment to traditional infrastructure or development financing. A number of new sources of funding that focus on CCA related interventions have been (or are being) created both at national and international level. The most significant donors¹⁰ in the CCA and DRM domain over the last five years have been the Asian Development Bank (ADB), Global Environment Facility (GEF), Australian Agency for International Development (AusAID) and Japan International Cooperation Agency (JICA). Much of this support has been channelled through regional initiatives coordinated by the Secretariat for the Pacific Community Applied Geoscience (SOPAC) and technology division of the Secretariat of the Pacific Community (SPC) or through the South Pacific Regional Environment Program (SPREP).

¹⁰ Other donors also responsible for financing or implementing programs include the GIZ, Global Facility for Disaster Reduction and Recovery (GFDRR), United Nations Development Program (UNDP), United States Agency for International Development (USAID), and International Union for Conservation of Nature (IUCN).

C. ADB Sector Experience and Assistance Program

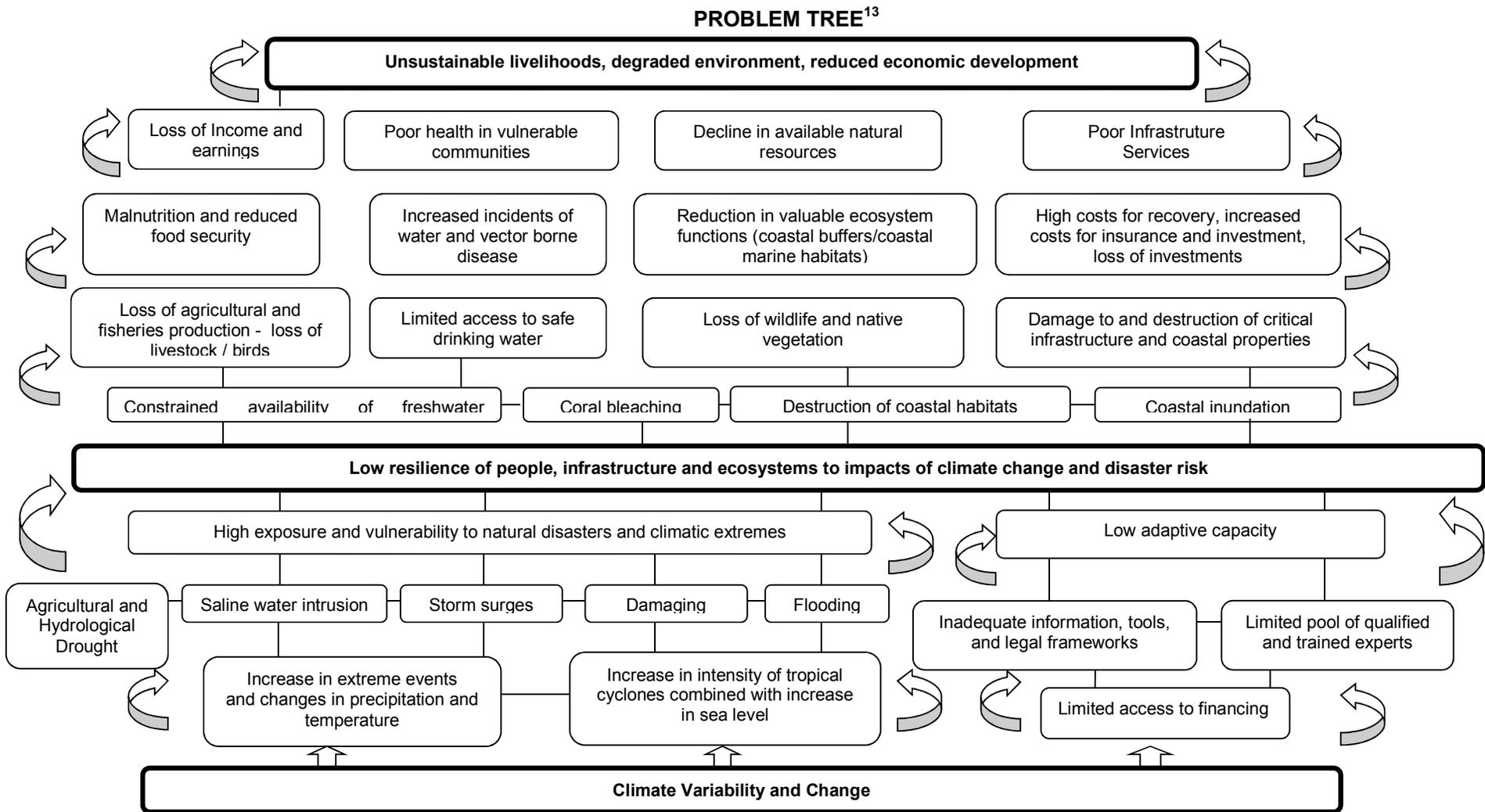
13. The ADB has developed a strong partnership with the government. Both ADB's Pacific Approach 2010–2014,¹¹ and COBP 2013–2015 for Tonga,¹² emphasize the need for integration of CCA and DRM to deal with climate-induced natural disasters. ADB is currently supporting the Intergrated Urban Development Sector Project (IUDSP), the Nuku'alofa Urban Development Sector Project (NUDSP), the Implementing Strategic Economic Management TA, and the Public Finance Management Road Map. These projects and programs provides ADB with a clear understanding of the challenges Tonga faces in mainstreaming climate change considerations into government operations.

14. The Ministry of Finance and National Planning (MFNP), is currently the executing agency (EA) for all ADB financed projects, including those focusing on infrastructure sector investments. In addition, the MOI has experience with ADB sector projects, including IUDSP and NUDSP. JNAP-TWG which is the leading institution in the sector includes line ministries with relevant CCA and DRM divisions such as NEMO, Natural Resources Division, Tonga Water Board, TMS, all of which have experience working with ADB or with other MDB financed projects.

15. Finally, ADB has extensive experience working with MFNP to implement its public financial management reforms, in particular corporate planning and program budgeting reforms. This support has been channeled through capacity development TA projects and the joint policy reform matrix process for budget support and has resulted in a number of significant achievements including steady improvements in its ratings under the Country Performance and Public Expenditure and Financial Accountability assessments carried out by ADB and the World Bank respectively. Moreover, among the ten Pacific Island Countries that have completed these assessments, Tonga had the highest number of high ("A" or "B") ratings in the region, i.e. 12 As or Bs out of the 31 dimensions assessed. More recently, a 2012 Australian Government Assessment of National Systems found that most aspects of the Tongan PFM system were well enough developed that they could manage direct budget support in a transparent and accountable manner.

¹¹ ADB. 2010. ADB's Pacific Approach 2010–2014. Manila.

¹² ADB. 2012. Country Operations Business Plan: Tonga 2013-2015. Manila.



¹³Note: The Problem Tree is based on the outputs of the PPCR National Consultative Workshop (23–25 November 2011) and the community consultations through semi-structured interviews, focus groups and household surveys of vulnerable communities in Vava'u and Tongatapu in November 2011 under RETA 7827. Source: Asian Development Bank