



# STATE OF THE TROPICS

2014 REPORT



A comprehensive report by key research institutions exploring environmental, social and economic indicators

Published by James Cook University Townsville on behalf of the State of the Tropics leadership group.

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Cairns  
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## Foreword

The world's tropical region has long captivated the imagination of outsiders. Aristotle viewed the 'Torrid Zone' as an uninhabitable region of oppressive heat and pestilence; early European explorers and colonisers considered the region to be full of opportunity and ripe for discovery and exploitation; scientists have long worked to uncover its secrets; artists have been inspired by it and it has been idealised as a paradise, characterised by aqua blue seas, benign peoples and jungles teeming with exotic wildlife. The Tropics have long been defined by these views, invariably promoted and sustained by people who live outside the region: views which have shaped, and in many cases, framed policies and approaches to the region that have not necessarily been appropriate or beneficial.

In recent times, east/west, north/south, developed/developing axes of understanding have dominated our worldview, while that fundamental Aristotelian, lateral perception of the world has faded from view.

Yet, almost half the world's population call the Tropics home. People have lived, even thrived in the region for millennia. Across all parts of the region, they have mastered their tropical domains. Many peoples of the Tropics continue to live on their traditional lands, working determinedly to adapt their traditional ways to meet the challenges of a rapidly changing world, even as economic powerhouses have emerged elsewhere in the Tropics.

Despite the Tropics being a place of extraordinary biological and cultural diversity, the peoples of the Tropics across the globe share a common bond: their ability to adapt to and thrive in Aristotle's 'uninhabitable' zone. There is much the wider world can learn from the many innovative approaches to life adopted by the various peoples in the region; approaches which have served those peoples well.

Of course, the region is not without its challenges. For a variety of reasons, both imposed from the outside and born from within, the Tropics have lagged behind the rest of the world. In many ways, this makes the Tropics more vulnerable to the world's grand challenges than other regions.

At a time of increasing concern about social, environmental and economic sustainability, a different approach is long overdue. It is time to recognise and acknowledge the Tropics as a region defined from within, rather than without, to embrace the wisdom and experience of its peoples and to ensure that solutions of merit deployed in one part of the Tropics can be shared elsewhere, across the Tropics and beyond.

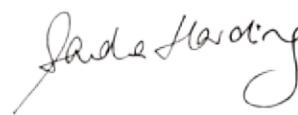
This is the approach taken by State of the Tropics. This report provides the first in-depth, impartial assessment of the Tropics as an environmental and geopolitical entity in its own right. It draws on the expertise, knowledge and diverse backgrounds of leading institutions across the region to assess the state of the region; to better understand the

implications of the immense social, economic and environmental changes the region is experiencing and frame a pathway for a prosperous and sustainable future.

This report demonstrates that nations in the Tropics have made extraordinary progress across a wide range of environmental, social and economic indicators in recent decades. It also highlights the many significant and unique challenges the region continues to face.

There is much to learn here. And while this report shines a spotlight on the tropical world, its power and potential, the rest of the world is inevitably engaged, challenged and redefined by its findings as well.

By taking a unique perspective from within the Tropics, by and for the people that live in the region, and acknowledging the critical need to balance ongoing development and human wellbeing with environmental sustainability, State of the Tropics provides a base camp for the long, but increasingly achievable climb to a more prosperous global future.



**Professor Sandra Harding**





Burma/Myanmar.  
Image: UN Photo.

## Executive summary

In early 2011 a group of leading research institutions with an interest in tropical issues united to examine the condition of life in the Tropics. The group met in Singapore in mid-2011 to scope a project that would draw on shared expertise to report trends across a broad range of environmental, social and economic indicators. The intent was to shed light on a simple question: Is life in the Tropics getting better?

This report is the culmination of that collaboration. Across a broad range of environmental, social and economic indicators, the Tropics emerges as a critical global region with a unique set of development challenges and opportunities. The Tropics covers only 40% of the world's surface area, but hosts approximately 80% of its terrestrial biodiversity and more than 95% of its mangrove and coral reef-based biodiversity. The tropical world's economy is growing 20% faster than the Rest of the World and many tropical nations are important contributors to world trade, politics and innovation. The Tropics is home to 40% of the world's population, and 55% of the world's children under the age of five years old. By 2050, some 50 per cent of the world's population and close to 60% of the world's children are expected to reside in the Tropics. Advances in technology are providing a platform for expanding business opportunities, enhancing prospects to reduce poverty, and improving education and health outcomes. Incomes are higher, infrastructure is more accessible and life expectancy is the highest it has ever been.

While there have been rapid improvements, assessment of key indicators of wellbeing such as life expectancy and economic output per capita show that the Tropics still lags behind the Rest of the World. The region is at a critical juncture. The resources required to sustain larger populations and economic growth are putting significant and increasing pressures on the natural environment; poverty remains prevalent in many areas; many nations suffer from poor health and educational outcomes; significant investment in infrastructure is still required in many nations; and, in some cases, political and economic instability and poor governance are major constraints that

limit development. Clearly, while on the right track, much remains to be done. The range and significance of shared issues facing nations and territories in the Tropics suggests it is timely to examine the characteristics and challenges facing the tropical region as an entity in itself.

By assessing a broad range of environmental, social and economic indicators the inaugural State of the Tropics Report shines a light on the people and issues of the tropical world, and contributes to efforts to improve the lives of the peoples of the Tropics and their environments.

In this report, findings are reported based on two key systems essential to assess progress and sustainability; the ecosystem and the human system. The ecosystem is recognised as providing services that underpin all life on Earth. The human system is considered a subset of the ecosystem acknowledging that ecosystem 'health' is essential to sustainable health, development and progress in the human system.

## The Ecosystem

For many ecosystem indicators, the Tropics is in much better condition than the Rest of the World, although increasing population and affluence are placing greater pressures on the natural environment. Rapid growth in global trade and the exploitation of resources for export markets by more developed nations are also contributing to the ongoing and increasing risk to the ecological health of tropical ecosystems.

### Key Findings:

#### The Atmosphere

- Across the world total and per capita greenhouse gas emissions are increasing.
- Consistent with rapid economic growth since 1980 the Tropics' share of global energy generation has more than doubled, from 7% to 15%. The Tropics produces 23% of global renewable energy, mostly through hydroelectricity generation.

- Air quality has improved in the Tropics and in the Rest of the World in the 20 years to 2010. The extent of the improvement is variable by region, and is in part dependent on climatic and geographical constraints. However, no tropical region has yet reduced PM<sub>10</sub> levels (a measure of small particulate matter) to the World Health Organization's guideline of 20µg/m<sup>3</sup>.

### Land and Water

- Nearly one-third of all land in the Tropics experienced some form of degradation over the past three decades. Deforestation and poor agricultural practices are the major causes of degradation in the Tropics.
- Although the amount of land used for agriculture increased by only 2% in the Tropics between 1980 and 2009, productivity of that land has increased dramatically. Livestock production increased by almost 90% and cereal production more than doubled. However, agricultural productivity in the Tropics remains significantly lower than in the Rest of the World.
- The Tropics has just over half of the world's renewable water resources (54%), yet almost half its population is considered vulnerable to water stress. Although tropical rivers are on average less polluted than those in the Rest of the World, there is large regional variation, with South East Asia having the highest pollution discharge in the world.

### Oceans

- Exploitation of wild marine food resources in the Tropics has grown rapidly over the past 60 years due to greater demand for seafood from a growing and increasingly affluent population and greater fishing effort by international fishing vessels.
- The rate of growth in marine catch has slowed considerably in recent years as more fisheries become fully exploited or overexploited.
- Threats to coral reef systems have increased markedly in recent years with over half the reefs in the Tropics now considered to be at medium or high risk of damage.
- The Tropics host nearly 95% of the world's mangrove forests by area and 99% of

mangrove species. The area of mangrove forest has decreased in all tropical regions since 1980.

### Biodiversity

- Biodiversity is greater in the Tropics across most taxonomic groups, with an equivalently higher proportion of threatened species. For those plants and animals for which there are adequate data, loss of biodiversity is greater in the Tropics than in the Rest of the World.
- The Tropics have a greater proportion of terrestrial area under formal protection than the Rest of the World. However, management effectiveness in these protected areas is variable, and many are still subject to illegal encroachment and exploitation.
- The proportion of marine area under formal protection is lower than for terrestrial areas, and the proportion under protection in the Tropics is lower than for the Rest of the World, although the gap is narrowing.
- Tropical biodiversity is being threatened by the rapid loss of primary forests, though since 2000 the rates of loss are reported as slowing in most – though not all – regions. New remote sensing technologies suggest losses may be under reported in some regions.

Into the future, the challenge will not only be to sustainably manage resources, but to also recognise the importance of less tangible aspects of ecosystem health and services that operate at multiple scales in both time and space. This will require cooperation at local, national and international scales to ensure that valuable ecosystems are protected and maintained.

## The Human System

### Society

Societies are the result of humans interacting with one another, sharing interests, cultures and traditions. Healthy, connected societies are essential for growth and wellbeing. This section of the report explores the status of tropical societies in terms of poverty, urban and slum living conditions, health, education and employment.

Outcomes are improving rapidly for the majority of Society indicators across the Tropics. A smaller proportion of people are living in extreme poverty, and more people have access to a more nutritious diet, and have better health and education outcomes than in past decades. Despite these improvements, the Tropics bears a disproportionate share of the global burden of many communicable and preventable diseases.

### Key Findings:

#### Poverty and urbanisation

- Globally, extreme poverty has declined by almost 50% since the early 1980s, but more than two-thirds of the world's poorest people live in the Tropics. Most poverty reduction in the Tropics has occurred in South East Asia and Central America. The number of people living in extreme poverty in Central & Southern Africa has more than doubled in this time although the rate has been stable over the past five years.
- Consistent with the higher levels of poverty, more people experience undernourishment in the Tropics than in the Rest of the World. However, the prevalence of undernourishment in the Tropics has declined by one-third over the past two decades.
- In the Tropics the urbanisation rate has increased considerably faster than globally, from 31% of the population in 1980 to 45% in 2010. Despite this, a greater proportion of people in the Rest of the World (56%) live in cities compared with the Tropics.
- The proportion of the urban population living in slum conditions is higher in the Tropics than in the Rest of the World.

#### Health

- Life expectancy has increased across all regions of the Tropics in the past 60 years, but is still well below that of the Rest of the World. Nonetheless, the gap has narrowed from 12.1 years to 7.7 years since 1950.
- All regions in the Tropics have experienced significant decreases in maternal and child mortality rates since 1950. However, on a global scale the Tropics accounts for the vast majority

of these deaths, with 76% and 72% of mother and child under-five deaths respectively.

- The adult obesity rate in the Tropics is lower than in the Rest of the World, but is increasing at a faster rate. Non-communicable diseases are a growing cause of illness, disability and death in both the Tropics and the Rest of the World.
- HIV prevalence among people aged between 15 and 49 years is higher than in 1990 but has stabilised or declined in most regions of the Tropics after peaking in the mid to late 1990s, and the AIDS mortality rate has been declining in all regions since 2005. Compared with the Rest of the World, prevalence and mortality rates are higher in the Tropics.
- Except in Oceania, tuberculosis incidence has decreased in all regions of the Tropics since 1990. The Tropics represented 56% of new cases globally in 2010.
- There are no time series data for malaria, but in 2010 the Tropics represented 96% of cases and 99% of deaths from malaria, with Central & Southern Africa having the greatest burden.
- There are no time series data for dengue, but available data suggest 72% of infections occur in the Tropics, with South Asia and South East Asia having the highest number of cases, and the Caribbean the highest incidence rate. Other neglected tropical diseases such as soil transmitted helminthiasis, schistosomiasis and lymphatic filariasis cause significant disability, disfigurement and death, especially in impoverished communities in the Tropics.

#### Education and Work

- Mean years of schooling of adults has almost doubled in the Tropics since 1980, but is still 2.5 fewer years of schooling than adults in the Rest of the World.
- Youth literacy rates have increased in all regions of the Tropics except in Oceania since 1990, but are consistently lower than in the Rest of the World.
- Adult literacy rates have increased faster in the Tropics than the Rest of the World but are still considerably lower. Despite the improvements, the overall number of illiterate adults in the Tropics is increasing.

- The unemployment rate is cyclical and influenced by economic growth. In the Tropics, the unemployment rate has declined steadily since the turn of the century and only showed a small increase in 2009 during the global financial crisis, before returning to pre-crisis levels.

#### Economy

The past 60 years has seen a dramatic rise in living standards across the world, and even nations that are relatively poor today enjoy living standards that were unprecedented 100 years ago. The reasons for this development are varied and complex, but economic growth is a useful indicator of improvements in living standards. Nations that have strong economic growth are better able to reduce poverty rates, strengthen political stability, improve the quality of the natural environment and even diminish the incidence of crime and violence.

#### Key findings:

##### Economic output and government

- The Tropics has outperformed the Rest of the World in terms of economic growth over the past 30 years. The Tropics is now estimated to represent 18.7% of global economic activity, up from 14.5% in 1980. Despite this, available data suggests Gross Domestic Product (GDP) per capita in the Tropics is currently estimated to be only one-third that of the Rest of the World.
- The public sector debt service burden has been improving across most regions of the Tropics over the past three decades as a result of stronger economic growth and, especially for poorer nations, the impact of debt relief programs. As a proportion of GDP the debt service burden declined in the Tropics by two-thirds between 1980 and 2010.

##### International trade and investment

- Exports of goods and services as a percentage of GDP have grown rapidly in the Tropics in the past 30 years, increasing from 25% to 47%. Export earnings, however, are only 21% of the global total. Export earnings tend to be more

important to national incomes in the Tropics than in the Rest of the world.

- Imports of goods and services to tropical nations have increased rapidly in the past 30 years from 26% to 45% of GDP. The volume of imports to the Tropics grew by 210% during this period. Nevertheless, the volume of exports continues to exceed the volume of imports.
- Foreign investment increased in all regions of the Tropics in the 30 years to 2010. Investment to tropical nations increased from 0.7% of Gross National Income (GNI) to 3.5%.

#### Science and technology

- In the Tropics investment in research and development is increasing modestly, while the number of published science and technical journal articles and enrolments in tertiary education are growing rapidly from a low base. There is substantial regional variation in trends.
- Despite these improvements, compared with the Rest of the World, there is less investment in research and development, fewer tertiary enrolments per capita and fewer scientific and technical journal articles produced in the Tropics. Investment in technology and innovation will be important for the tropical region as a whole to be competitive in future knowledge-based economies.

#### Governance

Governance is about how companies, institutions and nations are organised to manage affairs, power and responsibilities. It is the process used to implement and monitor decisions, policies and legislation.

Generally, the Tropics shows a poorer result than the Rest of the World across governance indicators. However, there has been rapid improvement in recent decades.

Sing sing, Papua New Guinea.  
Image: Mark Ziembicki.



## Key Findings:

### Human security, crime and corruption

- Refugee numbers in the Tropics declined significantly during the 1990s, but numbers have stabilised at around 4 million over the past decade. The decline in refugee numbers in the Tropics between 1990 and 1999 was driven by the repatriation of significant numbers of refugees to Mozambique and Ethiopia. Although not reported here, refugee numbers in the Rest of the World have increased recently due to conflict in the Middle East.
- Although time series data are not available, the homicide rate in the Tropics is considerably higher than in the Rest of the World. Overall, the Tropics reported a homicide rate of 14.5 per 100,000, compared with a rate of 5.6 per 100,000 in the Rest of the World. However, within the Tropics there is great regional and national variation. For example, the homicide rate in South America was 32.9 per 100,000 compared to 5.1 per 100,000 in South Asia.
- The Tropics achieved lower scores than the Rest of the World for a range of governance indicators, indicating higher rates of corruption.

### Gender equality

- Improving wellbeing across society requires people to have similar opportunities with respect to education, employment and decision-making.
- Comparing the Tropics with the Rest of the World, fewer females attend secondary education relative to males, although the gap is closing.
- Globally, the representation of women in different sectors of society is improving. The proportion of women in national parliaments worldwide increased from 12% in 1997 to 20% in 2011. The improvement is broadly similar in the Tropics and the Rest of the World, increasing from 10% to 18% and 13% to 20% respectively.

### Infrastructure

- Worldwide, the rate of gross capital formation as a percentage of GDP has declined marginally since 1980, but is highly variable across nations and, in the Tropics there has been an upward

trend. The performance of the Tropics varied substantially with some regions displaying higher growth and variability than others.

- Although the gap has narrowed, the proportion of the population with access to safe drinking water is lower in the Tropics than in the Rest of the World. In the Tropics the proportion of the population with access to safe drinking water has increased from 67% to 81% since 1990.
- Poor sanitation is a major issue in many tropical nations, especially those with rising populations and increased urbanisation. However, global sanitation coverage increased from 48% of the population in 1990 to 63% in 2010, and the number of people with access to improved sanitation facilities increased from 2.5 billion to 4.3 billion. The number of people with access to improved sanitation facilities in the Tropics doubled from 0.7 billion to 1.4 billion.

#### Information communications and technology

- Over the past decade the mobile phone has emerged as one of the fastest growing consumer technologies ever introduced. In the Tropics, mobile telephony has become the dominant means of communication and the principal gateway to increased ICT access and use, with penetration rates reaching 68% up from almost zero in the early 1990s.
- Internet diffusion in the Tropics has grown quickly in terms of both users and penetration, though access is considerably less widespread than mobile communications. A growth rate of 30% per annum since 2000 (twice that in the Rest of the World) has seen internet users in the Tropics increase to 471 million, or 17% of the population.

This report also includes five essays, written by experts from around the world, exploring climate change, health and development in the Tropics.



Mong Kok, Hong Kong.  
Image Luke Chan.

## Acronyms used in this report

ACOSS	Australian Council of Social Services (Australia)	MEA	Millennium Ecosystem Assessment
ADB	Asian Development Bank	NASA	National Aeronautics and Space Administration (USA)
AFMA	Australian Fisheries Management Authority (Australia)	NHMRC	National Health and Medical Research Council (Australia)
AIDA	Interamerican Association for Environmental Defense	NOAA	National Oceanic and Atmospheric Administration (USA)
ALI	Australian Landcare International	NSF	National Science Foundation (USA)
APEC	Asia Pacific Economic Cooperation	OCHA	United Nations Office for the Coordination of Humanitarian Affairs
ATA	Alternative Technology Association		
AU-NEPAD	African Union - New Partnership for Africa's Development	OECD	Organisation for Economic Co-operation and Development
BIP	Biodiversity Indicators Partnership	OTA	Office of Technology Assessment, United States Congress
CBD	Convention on Biological Diversity	SPC	Secretariat of the Pacific Community
CDC	Center for Disease Control and Prevention	UN	United Nations
CFS	Committee on World Food Security	UN AIDS	Joint United Nations Programme of HIV/AIDS
CIA	Central Intelligence Agency (USA)	UN CCD	United Nations Convention to Combat Desertification
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)	UN DESA	United Nations Department of Economic and Social Affairs
		UN ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
DFAT	Department of Foreign Affairs and Trade (Australia)	UN HABITAT	United Nations Human Settlements Programme
ECOSOC	United Nations Economic and Social Council	UN REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation
EIA	Energy Information Administration (USA)	UN WTO	United Nations World Tourism Organisation
EPA	Environmental Protection Authority (USA)	UNCTAD	United Nations Conference on Trade and Development
FAO	Food and Agricultural Organisations of the United Nations	UNDP	United Nations Development Programme
FIVAS	Association for International Water Studies (Norway)	UNEP	United Nations Environment Programme
GBRMPA	Great Barrier Reef Marine Park Authority (Australia)	UNESCO	United Nations Scientific, Educational and Cultural Organisation
GSMa	Global System for Mobile Communications	UNFCCC	United Nations Framework Convention on Climate Change
HEI	Hedley Environmental Index	UNGEI	United Nations Girls Education Initiative
HK EPD	Hong Kong Environmental Protection Department	UNHCR	United Nations High Commissioner for Refugees
IAACA	International Association of Anti-Corruption Authorities	UNICEF	United Nations Children's Fund
IAEA	International Atomic Energy Agency	UNIFEM	United Nations Development Fund for Women
IBRD	International Bank for Reconstruction and Development	UNODC	United Nations Office on Drugs and Crime
ICAO	International Civil Aviation Organization	UNPF	United Nations Population Fund
ICRW	International Center for Research on Women	US AID	United States Agency for International Development
ICS-CERT	Industrial Control Systems Cyber Emergency Response Team	USIP	United States Institute of Peace
IEA	International Energy Agency	USITC	United States International Trade Commission
IFAD	International Fund for Agricultural Emergency	WB	World Bank
IFPRI	International Food Policy Research Institute	WCPA	World Commission on Protected Areas
IHC	International Housing Commission	WEDO	Women's Environment and Development Organization
IIDEA	International Institute for Democracy and Electoral Assistances	WEF	World Economic Forum
		WFP	World Food Programme
ILO	International Labour Organisation	WHO	World Health Organisation
IMF	International Monetary Fund	WMO	World Meteorological Association
IPCC	Intergovernmental Panel on Climate Change	WRI	World Resources Institute
IPU	Inter-Parliamentary Union	WTO	World Trade Organisation
ITC	International Trade Centre	WWF	World Wide Fund for Nature
ITIF	Information Technology and Innovation Foundation		
ITU	International Telecommunication Union		
IUCN	International Union for the Conservation of Nature		
MDG	Millennium Development Goals		



Haiti.  
Image: Logan Abassi, UN Photo.





Section 1

# The Tropics



Chapter 1  
State of the Tropics



## Introduction

Humanity has long sought to define the world through broad categories to help contextualise its diversity. Since Aristotle divided the world into Temperate, Torrid, and Frigid zones with the narrow view that only the Temperate region was habitable, we moved to North-South and East-West dichotomies. Other recent distinctions such as the First and Third World and developed and developing nations have also been made on the basis of socio-economic and political similarities and affiliations. Invariably such distinctions are too simplistic, and fail to recognise the inherent diversity of approaches, perspectives and realities faced by different regions and nations in relation to their own contexts and the broader global community.

The State of the Tropics report adopts a different approach. The intention here is not to add a further distinction dividing 'tropical' vs 'non-tropical' regions, but to recognise that the nations and territories within the Tropics share many unique challenges and opportunities that stem from more than their current and historical political and economic circumstances. Critically, it recognises geography and the environment as central to shaping human societies in the region, and the inextricable link between natural systems and human health, well-being and prosperity.

Occupying a distinctive geographical area between the Tropic of Cancer in the north and the Tropic of Capricorn in the south, the "Tropics" is a place of extraordinary diversity. As well as spanning a broad spectrum of socio-economic and political systems, the Tropics hosts most of the world's biological diversity, and is home to its most linguistically and culturally diverse regions. Stemming back to Aristotle, it is a region traditionally viewed by those from higher latitudes as essentially uninhabitable; hot and harsh and burdened by disease. Yet today its major biomes, including tropical savannas, deserts, rainforests and coral reefs are being increasingly transformed by human-dominated landscapes. With expanding agricultural areas, industrial infrastructure and some of the fastest growing megacities in the world, the tropical

region is a long way from the inhospitable 'Torrid Zone' described by Aristotle.

The Tropics today is home to 40% of the world's population – a figure projected to rise to 50% by 2050. The region's economy is growing 20% faster than the Rest of the World; its people are more educated than ever before and new technology is an increasingly pervasive influence. Not only is the Tropics a region that is changing rapidly, but it is also a region that has much to offer, and whose influence is set to rise dramatically in the coming decades. The nature of this influence will depend on how its many significant challenges are addressed.

Many tropical nations face greater and more imminent exposure to some of the critical issues of our time. Climate change, for example, has the potential to disproportionately affect the Tropics through impacts on human and food security, renewable water availability, rising sea levels, and vector borne diseases. The resources required to sustain larger populations and economic growth will put ever-increasing pressures on the natural environment, and poverty and poor health outcomes remain prevalent in many areas.

During the period examined in this report (1950 to the present), many tropical nations have undergone immense social and political change. For many nations in the Tropics, the second half of the 20th century was characterised by decolonisation and a move towards political independence.

For many, the transition has not been smooth, and has been burdened with civil conflict, dictatorships and, in some cases, large-scale genocide. Despite this unrest, strong democracies and stable economies have emerged from this period of change.

The range and significance of shared issues facing nations and territories in the Tropics suggest it is timely to examine the opportunities and challenges facing the tropical region as an entity in itself. It is time to systematically assess the state of the region, to take stock and to develop

the means to work towards a common future that recognises the potential of this dynamic and diverse region.

## The environment of the Tropics

The Tropics surround the Earth's Equator within the latitudes of the Tropics of Cancer and Capricorn at  $\pm 23.5$  degrees. These latitudes relate to the axial tilt of the Earth; in all areas between them the Sun reaches a point directly overhead at least once during the solar year.

Although topography and other factors contribute to local climatic variation, tropical regions are typically warm and experience little seasonal change in daily temperatures. Important features of the Tropics are the prevalence of rain in the moist inner regions near the equator, and increasing seasonality of rainfall with distance from the equator.

The Köppen-Geiger climate classification identifies the Tropics as being dominated by 'equatorial' and 'arid' climates, with the balance of the world being primarily 'warm temperate', 'snow' and 'polar' climates. Equatorial climates have a mean temperature for all months above 18°C (64°F), and arid zones are defined with reference to both temperature and rainfall, and are characterised by a general lack of water which constrains plant and animal life.

The Tropics host an estimated 80% of the world's terrestrial biodiversity and most of its marine diversity. A significant proportion of this diversity is already under threat, which climate change impacts are likely to amplify. Changes to climate are likely to have a greater impact in the Tropics than elsewhere because many species are specialised to deal with a narrow range of environmental conditions. Species in the Tropics are not as able to tolerate changes in climate as well as those accustomed to more significant changes in seasonal conditions in other parts of the world.

## The people of the Tropics

The number of people living in the Tropics, their demographic characteristics and distribution are an important influence on many of the measures of progress used in this report. The Tropics is home to 40% of the world's population, or more than 2.8 billion people. This is an increase of over 2 billion people since 1950 and equates to a growth rate of 2.2% per annum, considerably higher than growth of 1.4% per annum in the Rest of the World. By 2050 more than half of the world's population is expected to live in the Tropics. According to the World Bank, 21% of the tropical population currently resides in low income nations, a further 54% in lower middle income nations and the remainder in upper middle income and high income nations. Almost 99% of the tropical population live in a nation considered to be 'developing'.

Population growth rates have in fact been declining in most regions of the Tropics during the past 60 years, mostly because of declining fertility. Fertility has declined across all tropical regions including those with the most population growth. In 1950 a woman in the Tropics could be expected to give birth to around six children in her lifetime. Sixty years later this number has declined to 3.3. Fertility rates tend to decline with growing affluence and greater access to education.

The age structure in the Tropics differs quite significantly from the Rest of the World. Higher birth rates and lower life expectancy in the Tropics mean that children under 10 make up 23% of the population compared with 15% in the Rest of the World. Longer life expectancy in the Rest of the World equates to a much greater proportion of older age groups than in the Tropics. People over 70 years make up only 3% of the population in the Tropics compared with 7% in the Rest of the World. Based on median population growth and life expectancy assumptions, by 2050 the Tropics will be home to 60% of the world's children under 10 years old. Half of these children will live in Central & Southern Africa.



Child in Papua New Guinea.  
Image: Mark Ziembecki.



Irrigated fields, Nigeria.  
Image: Arne Hoel, World Bank.

## The State of the Tropics Project

In early 2011 a group of leading research institutions with an interest in tropical issues identified a need to examine the condition of life in the Tropics. The group met in Singapore in mid-2011 to scope a project that would draw on shared expertise to report trends across a broad range of environmental, social and economic indicators. The intent was to shed light on a simple question: Is life in the Tropics getting better?

This report is the culmination of that collaboration. By assessing a broad range of environmental, social and economic indicators it shines a light on the people and issues of the tropical world, and contributes to efforts to improve the lives of the peoples of the Tropics and their environments.

To answer the question of whether life is improving in the Tropics an evaluation of progress was made on national, regional and global scales. In this case, progress refers to an increase in the sustainable and equitable well-being of a society. It is multidimensional and includes economic, social and environmental factors along with other areas considered important to quality of life (for example the quality of governance).

Given these multiple dimensions, answers to the fundamental question are likely to be positive for some aspects and negative for others. The concept of progress is influenced by an individual's perspective; what is viewed as progress by some will be seen as regress by others.

This report is a dispassionate, statistical analysis of a range of indicators that reveal trends and areas where progress is being made or lost. Analyses were based on data collated from existing, authoritative sources and included no new data collection.

The framework of the report is based on two key systems essential to assess progress and sustainability; the ecosystem and the human system. The ecosystem is recognised as providing services that underpin all life on Earth. The human

system is considered a subset of the ecosystem acknowledging that ecosystem health is essential to sustainable health, development and progress in the human system.

In the conceptual framework the ecosystem's domains are:

- Atmosphere (Chapter 2);
- Land and water (Chapter 3);
- Oceans (Chapter 4); and
- Biodiversity (Chapter 5).

These domains deliver services to the human system for a broad range of economic, social and aesthetic purposes.

In the conceptual framework the human system's domains are:

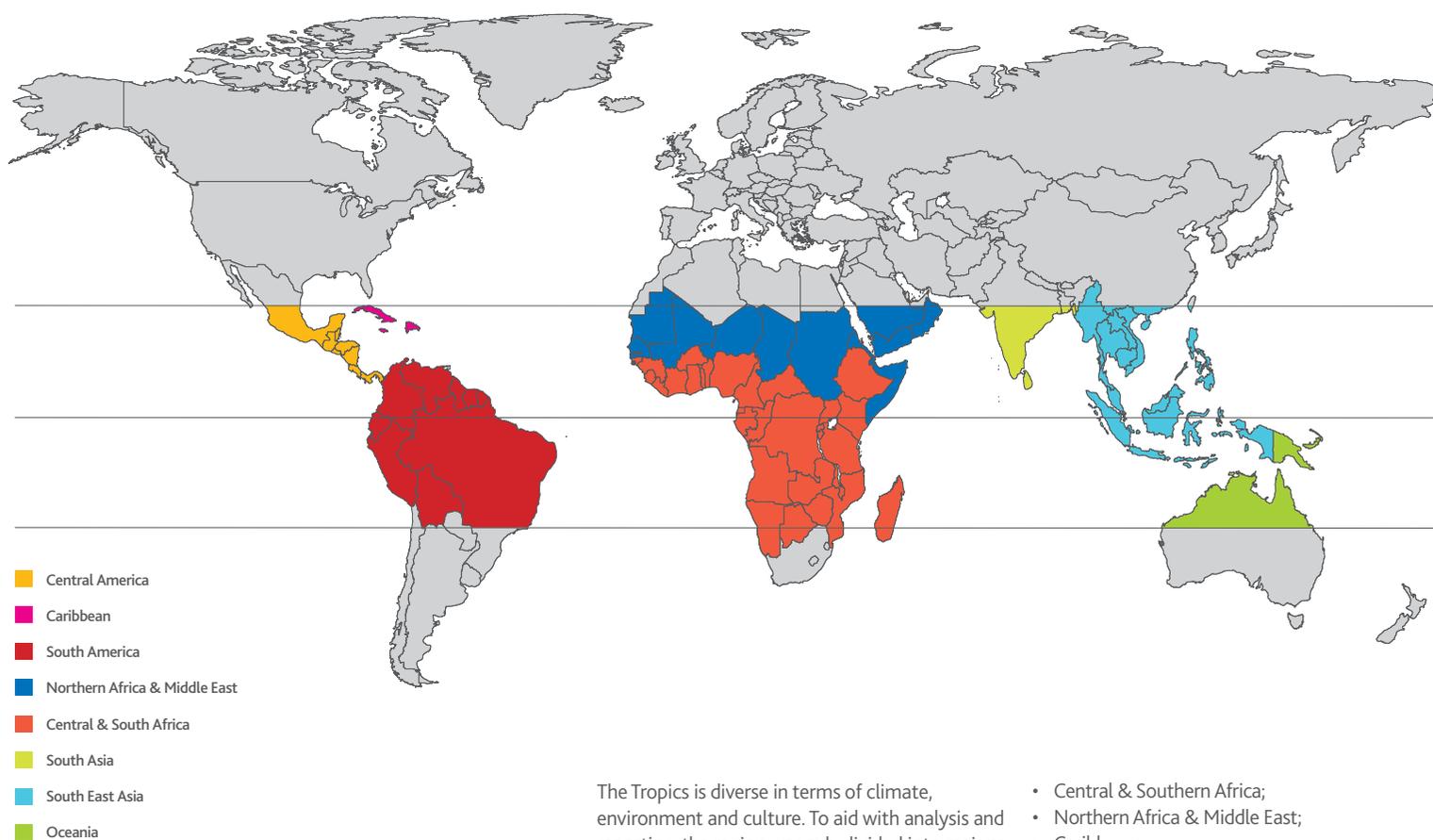
- Society (Chapter 6);
- Economy (Chapter 7); and
- Governance (Chapter 8).

These domains are recognised as critical in assessing societal progress. The human system's domains were further defined by dimensions, and indicators were identified to assess progress in each dimension. The indicators allow quantitative assessment of the domains and dimensions. It is through analysis of the indicators that the question of whether 'life in the tropics is getting better' is assessed. A full list of the indicators, data sources and coverage, is found in **Appendix A**.

The report also includes five essays by experts on climate change, health and development who provide comment on the current challenges and opportunities for the Tropics.

## Regions of the Tropics

Figure 1.1 Tropical regions of the world



The Tropics is diverse in terms of climate, environment and culture. To aid with analysis and reporting, the region was sub-divided into regions based on general geographical similarities to develop groupings that have some degree of commonality. There are a number of ways that this could be undertaken, including by climate (e.g. wet and dry Tropics) and by national borders.

As the majority of data are reported on a national basis, individual nations are the primary basis for these regional aggregations. The regional groupings used in this report are:

- Central & Southern Africa;
- Northern Africa & Middle East;
- Caribbean;
- Central America;
- South America;
- Oceania;
- South East Asia; and
- South Asia.

Analysis in the Report focusses on comparisons of regions rather than nations.

## Nations of the Tropics

To assess which nations and territories should be included in the Report two processes were applied. The first used a population-based decision tool to assess whether nations partially in the Tropics should be included in the Report, and the second reviewed data availability to assess whether sufficient data were available to warrant a nation's inclusion in the Report. Generally only very small nations were excluded.

The geographic area that is the Tropics is clearly defined as the region between the Tropics of Cancer and Capricorn. However, national borders do not align neatly with these latitudinal lines and there are a number of nations and territories that straddle the zone.

The following practical approach was applied to select nations and territories for inclusion in the Report:

- Nations that are wholly within the Tropics are included;
- Nations partially within the Tropics are included if:
  - The majority of the population (i.e. more than 50%) lives in the Tropics (e.g. Brazil, India); or
  - The proportion of the population living in the Tropics is 5% or more of the region's population living in the Tropics.

Using this decision tool 134 nations and territories were assessed as being in the Tropics (See **Appendix B**).

Large nations which straddle the Tropics (Mexico, Brazil, Saudi Arabia, India, Bangladesh, China, Australia and United States) were investigated at a sub-national level and divided into tropical and non-tropical regions (See **Appendix C**). Sub-national estimates were calculated using regional data where it was available or applying assumptions to national level data.

Reflecting the broad international scope of the project are the key institutions involved. These include: Escuela Superior Politécnica del Litoral (Ecuador), Instituto Nacional de Pesquisas da Amazônia (Brazil), James Cook University (Australia), Liverpool School of Tropical Medicine (England), Mahidol University (Thailand), Nanyang Technological University (Singapore), National University of Singapore, Organization for Tropical Studies (Costa Rica), University of Hawaii – Manoa (USA), University of Nairobi (Kenya), University of Papua New Guinea and University of the South Pacific (Fiji).



Fishing Boats.  
Image: Chris Chancellor.



