INTERNATIONAL DEVELOPMENT

Small Island Developing States

Building resilience and climate action

ARUP | We shape a better world

Foreword

Jo da Silva

Director
International Development

Small Island Developing States (SIDS) are on the front line of global climate change and feel the impacts very directly. The challenges they are facing are interconnected and require multi-sector solutions.

Arup takes a systems-approach to strengthen the resilience of SIDS to shocks and stresses, and to contribute to the ongoing wellbeing of the island populations, maximising the opportunity for them to remain in place.

Arup

Arup is an independent firm of multidisciplinary designers, engineers, architects, planners, and technical specialists working across every aspect of today's built environment.

Arup was founded in 1946 by Ove Arup, a gifted engineer-philosopher with an original and restless mind. Arup is owned in trust for its members, still guided by its founder's spirit and principles. We choose work where we can make a real difference in the world, stretch the boundaries of what is possible, help our partners solve their most complex challenges and achieve socially valuable outcomes.

Read more:

History →
Diversity →
Values →
Ethics →

International Development

The International Development team partners with organisations operating in the humanitarian and development sector, to contribute to safer, more resilient and inclusive communities and cities in emerging economies and fragile contexts across Africa, Latin America, the Caribbean, Asia and the Pacific, where the impacts of today's global challenges are felt most acutely.

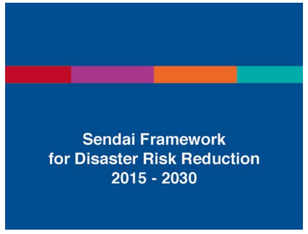
Read more:

International Development website →

Our Commitments

We are committed to advocating for and supporting the achievement of the United Nations Sustainable Development Goals (SDGs), and other key international commitments and agreements, including the Paris Declaration on Climate Change (2015), the Sendai Framework for Disaster Risk Reduction (2015), and the New Urban Agenda (2016).

Learn more United Nations Sustainable Development Goals (SDGs)



Learn more about The Sendai Framework for Disaster Risk Reduction 2015

Learn more about The Paris Declaration on Climate Change 2015

Learn more about The New Urban Agenda 2016

We can have a positive contribution to achieving the following SDGs.

GOAL 4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

GOAL 6
Ensure availability and sustainable management of water and sanitation for all.

GOAL 9
Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

GOAL 10
Reduce inequality within and among countries.

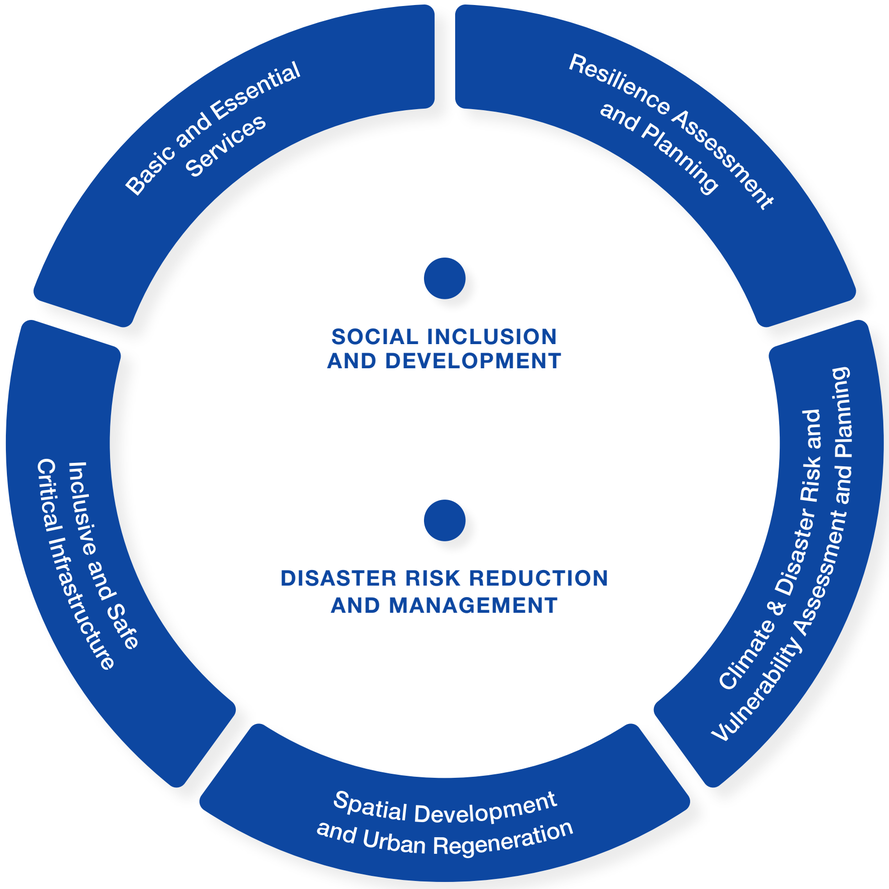
GOAL 11
Make cities and human settlements inclusive, safe, resilient and sustainable.

GOAL 13
Take urgent action to combat climate change and its impacts.

GOAL 17
Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Our services

We provide high quality strategic advice, technical expertise, training and capacity building in the areas of Resilient Urban Systems and Resilient Infrastructure & Services, ensuring that all our initiatives are designed and delivered in a way that promotes social inclusion and development, considers and minimises the impact of climate change and reduce the risk of repeat disasters.



Resilience Assessment and Planning

We conduct research on urban systems to anticipate trends and inform our projects and the development of tools, methods and training materials to enable resilience strategic planning and sustainable urban development. These tools have a spatial relevance, to effectively integrate future climate scenarios in planning and urban design decisions, and allow for better informed strategic investments, physical interventions and policy recommendations.

Small Island Developing States

Small Island Developing States (SIDS) are vulnerable to a range of shocks and stresses, and are particularly affected by climate change.

SIDS are often geographically remote, spatially dispersed, and low-lying. They are often highly exposed to global disruption, with undiversified economies, small domestic markets, and dependence on only one or two rapidly growing urban centres.

From densely populated urban centres of the Philippines and Taiwan, to atolls and archipelagos of the Caribbean, Asian-Pacific and Indian Ocean, over 600 million people living on islands are at risk. On the one hand, natural hazards such as cyclones, floods and storm-surges, exacerbated by climate change, in addition to geo-hazards specific to some islands represent major threats for the people, assets and economies of SIDS.

On the other hand, the long-term transformative effects of changes in climatic processes, such as average and peak temperature rise, erratic rainfall, and sea-level rise are magnified in the insular contexts, characterized by endogenous stressors such the depletion of eco-system services, urban growth, and fragile economies that rely heavily on external factors. Water scarcity from higher evaporation and salinization of water sources; subsidence and coastal erosion from sea-level rise; and impact on agricultural productivity in climate-sensitive economies, all greatly intensify risks in SIDS.

Our Approach

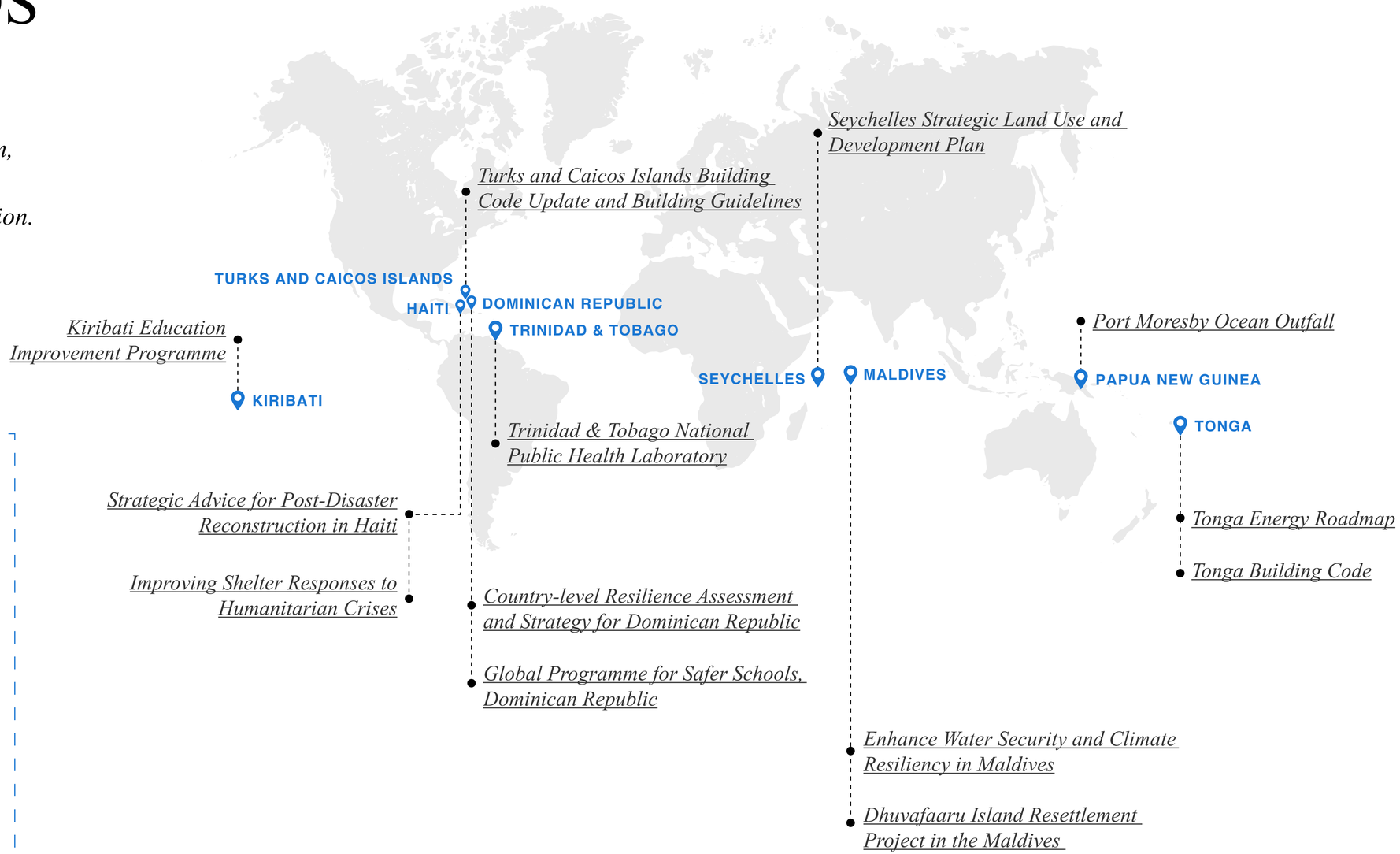
Challenges facing SIDS are interconnected and require a systems-approach to strengthen their resilience.

Despite their essential similarities, there is significant diversity among SIDS, which range in size, population, economy, access to resources, and the types of climate impacts they face. It is therefore essential to acquire a direct understanding of local resilience conditions and capacities, and the current and long-term effects of climate change on each island state.

At the same time, we acknowledge the need to define spatially how future climate scenarios will impact SIDS' resilience, for decision makers and investors to take evidence based decisions that guide sustainable policies, plans and investments. We work with local actors to develop appropriate approaches to deliver quality outcomes that can be managed and maintained over the long term.

Our work in SIDS

We work across the Pacific, the Caribbean, and the AIMS (Atlantic, Indian Ocean, Mediterranean and South China Sea) region.



GLOBAL AND REGIONAL PROGRAMMES

Spatial methodology for resilience planning and climate action in SIDS

Towards a Resilience Index for Pacific Island Nations

Pacific Safer Schools Roadmap

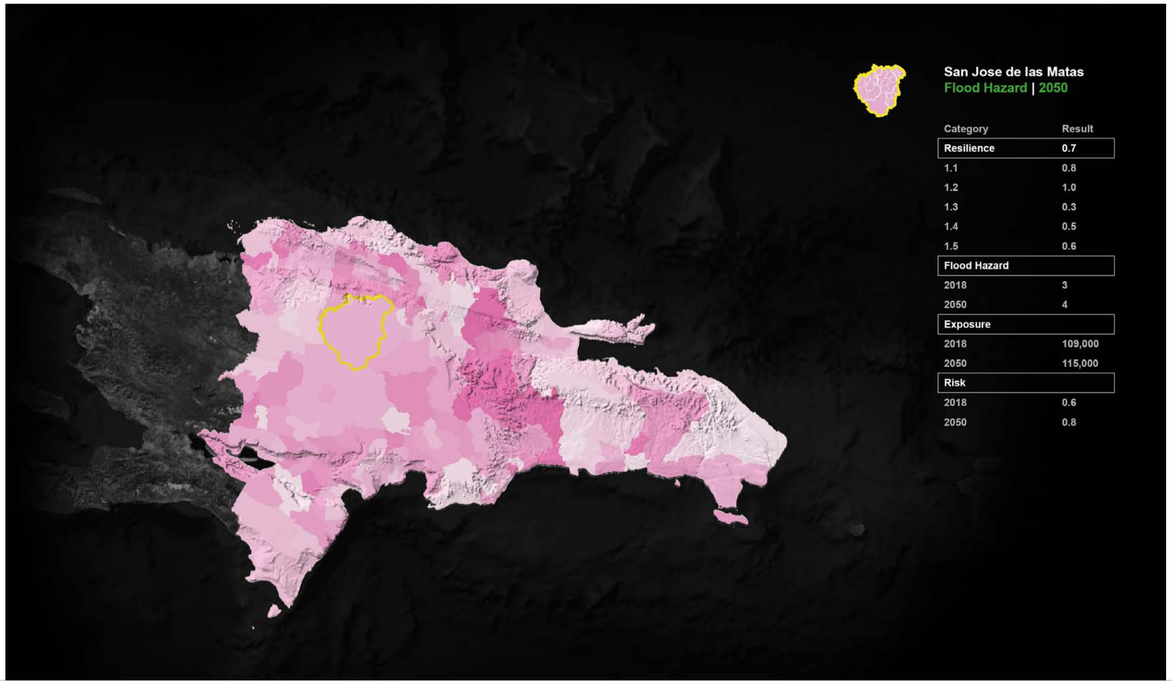
GLOBAL PROGRAMMES IN SIDS

Spatial methodology for resilience planning and climate action in SIDS

About

Arup has developed a spatial analysis methodology to assess and map resilience and factor predicted impacts of climate change in SIDS. It supports the development of a resilience-building strategy and climate action plan, guided through a set of spatial and sectoral adaptation interventions and priority projects.

This work leverages Arup's knowledge and previous work in urban resilience and SIDS, including the development and application of the City Resilience Index (CRI), the City Resilience Framework (CRF), and the City Water Resilience Framework (CWRF). Arup has also progressed internal research towards developing a resilience index to focus action and support to improve resilience of low lying Pacific Island Nations to sea level rise.



Impact

This analytical and planning methodology will enable decision-makers and planners in SIDS to take long-term decisions in both land-use governance and sectoral investments, based on the understanding of current state of resilience to the potential impact of a variety of shocks and stresses, both natural and human-induced, and future scenarios resulting from changes in climate.

PARTNERS:

Arup Research Funds

GEOGRAPHY:

Global

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE PACIFIC

Towards a Resilience Index for Pacific Island Nations

About

Arup has taken the first step towards developing a resilience index to focus action and support to improve resilience of low lying Pacific Island Nations to sea level rise. The world's climate is changing. Sea level rise in the western tropical areas of the Pacific Ocean is currently four times the global average. Many atolls in the Pacific are less than 5m above sea level and are home to thousands who feel connected with both their land and ocean. A changing climate will affect their physical environment, customs and culture.

© Professor Richard Moyle

Impact

Arup undertook an initial literature review to understand the existing knowledge base with regard to this issue. Using this evidence, we have begun to develop a three-stage process to understand the resilience and vulnerability of specific Pacific Island Nations:

Phase 1: We drew up a long list of the most physically vulnerable islands in the region based on an affected population of over 500, and low lying islands under 500m above sea level or those that are projected to have above average sea level rise for the region.
Phase 2: We adapted an existing approach for an international vulnerability index, developed by Barnett & Adger, 2003 and applied it to the long list. The most vulnerable islands are those with a low GDP/capita, high population density and high length of coastline compared to area.
Phase 3: An outline has been developed and further work will be required to assess this stage in detail.

PARTNERS:

Arup Research Funds

GEOGRAPHY:

Pacific Islands

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE PACIFIC

Pacific Safer Schools Roadmap

About

The Pacific region is highly vulnerable to the impacts of climate change and disasters. Building the resilience of the education sector is a key component of increasing the capacity of vulnerable communities to prepare for, and reduce the risks of, natural hazards. Each year across the region, disasters result in school buildings being destroyed or severely damaged, leading to loss of life, injury and disruption to children's education. To address this issue, the World Bank is seeking to undertake a coordinated series of research and capacity building activities across Samoa, Tonga, and Vanuatu to increase the resilience of schools infrastructure.

Arup is supporting the World Bank develop a Safer School Program for each country (Pacific Safer School Roadmap) which includes; undertaking risk assessments in each country to increase understanding of hazards and vulnerabilities of schools; creating a Knowledge Exchange Programme; and strengthening the institution and regulatory environment.

© Emma Blanch

Impact

The aim of this program is to achieve a quantifiable improvement in disaster-related losses in the education sector (for example, a reduction in school down-time, a reduction in rebuilding cost following disaster, a reduction in loss-of-life).

Our assessment of the exposure and vulnerability of school infrastructure to local hazards assisted respective national Governments to develop school reconstruction and retrofitting programmes and to encourage increased investment in school infrastructure. Through this Program Arup will gather data from multiple sources and develop a Pacific-wide repository of information on the safety and resilience of existing school infrastructure; identify systemic challenges affecting to the planning, construction, management, and maintenance of resilient schools, and provide recommendations to address these challenges; develop knowledge products and tools aimed at improving capacity in-country such that local stakeholders are better equipped to plan, construct, manage, and maintain resilient school infrastructure.

PARTNERS:

World Bank

GEOGRAPHY:

Tonga, Samoa and Vanuatu

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE PACIFIC

Tonga Energy Roadmap

About

The opportunity to drive the redesign of an entire country's energy network doesn't come along every day, but Arup is doing that now in the Kingdom of Tonga, the remote South Pacific island nation, 2400kms from New Zealand. At present, almost 80% of Tonga's energy generation is from diesel. Fuel accounts for 25% of all imports by value and 10% of GDP.

Arup is working on a transformational project to reduce Tonga's vulnerability to oil price volatility and improve its economic and environmental position. We are working with the country's electricity provider, Tonga Power Limited (TPL), to ensure an orderly transition to greater levels of renewable energy sources – wind, solar and Battery Energy Storage Solutions (BESS).

Impact

We have been developing an Energy Roadmap which will enable Tonga to achieve 58% renewable energy generation by 2020, with an increasing deployment to the maximum possible by 2030. This is significantly more than previously thought feasible. Our roadmap includes plans to create a hybrid solar, wind and BESS microgrid on Tongatapu. However, the annual cyclones present a problem with wind generation, limiting the size of wind turbines. For reliability, some portion of diesel generation will potentially need to remain as back-up.

The economic impact of achieving the projected outcomes extends beyond reducing imported fuel costs. A reliable and sustainable energy source can enable Tonga to make new plans for the economy — improve agricultural productivity, develop the tourism industry and invest in upskilling its people.

PARTNERS:

Tonga Power Limited

GEOGRAPHY:

Tonga

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE PACIFIC

Tonga Building Code

About

On January 11, 2014, Tropical Cyclone Ian (TCI) hit Tonga.T he reported damages and losses equated to approximately USD 49.5 million. The housing sector bore the brunt of damages and losses from the cyclone. Public buildings were also damaged and/or destroyed in the cyclone.

In response, the World Bank Group prepared the "Tonga Cyclone Ian Reconstruction and Climate Resilience Project (TCIRCRP)" which was part funded by the Kingdom of Tonga. The development objectives of the TCIRCRP includes strengthening the country's resilience to natural disasters. As part of this programme Arup has been appointed by the Kingdom of Tonga –to review, strengthen and update components of the Tonga Building Code (TBC) and develop a Supplement to the TBC to provide deemed-to-satisfy rules for the structural requirements of private dwellings.

Impact

Our work aims to strengthen the resilience of Tonga and the application of the Tongan Building Code (TBC) in reconstruction activities. Arup have strengthened and updated the Building Code, with a particular focus to strengthen the sections relating to cyclone and seismic resilient standards, and have designed and supported the Kingdom of Tonga develop dissemination plans for public awareness and enforcement. The development of a Residential Housing Guide to supplement the Code extracts key messages for influencing building practices, and highlights measures that practically can be attained by low income groups.

PARTNERS:

Kingdom of Tonga (Ministry of Infrastructure)

GEOGRAPHY:

Tonga

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE PACIFIC

Kiribati Education Improvement Programme

About

Arup was engaged by Coffey International as part of Phase 1 of the AusAID funded Kiribati Education Improvement Program (KEIP). Phase 1 of KEIP included the improvement of educational facilities, a review of legislation and policy, workforce development and support of curriculum and assessment development. Arup provided practical structural design and construction advice associated with the upgrade of existing outer island schools owned by the government. The initial phase of the programme trialled the use of different material types as well as different sources for these materials.`

Impact

The design advice considered the challenges of material supply to the remote outer islands of Kiribati including long distances and limited service providers. Arup's structural design advice considered the exposed, corrosive environments which exist on coral atolls. The design prioritised durability while ensuring building materials that were acceptable to the community.

PARTNERS:

Coffey International Ltd

GEOGRAPHY:

Kiribati

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE PACIFIC

Port Moresby Ocean Outfall

About

Due to rapid urbanization and in light of the limited sewerage infrastructure, Port Moresby has seen the degradation of quality of its sea water and marine ecology, reduction of volume of coastal fishery catch and an increase in health risks to the local population.

Impact

Arup designed a marine outfall and diffuser system that discharges treated effluent into the sea utilised an understanding site specific requirements and innovative 3D modelling technology to deliver the client a clear visualisation of benefits.

PARTNERS:

Pacific Marine Group Pty Ltd

GEOGRAPHY:

Port Moresby, Papua New Guinea

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE CARIBBEAN

Country-level Resilience Assessment and Strategy for Dominican Republic

About

Arup is working with national ministries and key stakeholders in the Dominican Republic to undertaking a country-level resilience assessment and mapping, considering also the impact of climate change.

The country-level resilience assessment will support the development of a resilience-building strategy and climate action plan, guided through a set of spatial and sectoral adaptation interventions and priority projects.

Impact

This work will strengthen government capacity to mainstream resilience, by predicting the effects of climate change on the island characteristics, systems and functions, and developing strategies and investment projects based on multi-source spatial evidence.

PARTNERS:

Government of the Dominican Republic, European Commission and UNDP

GEOGRAPHY:

Dominican Republic

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE CARIBBEAN

Global Programme for Safer Schools, Dominican Republic

About

The Global Programme for Safer Schools (GPSS) is a global knowledge, advisory and technical assistance programme linked to education policy lending or school infrastructure investment programmes that are financed by national governments, multilateral donors such as the World Bank or bilateral donors.

GPSS aims to create the enabling environment for safer schools and to make the planned investment resilient to natural hazards from the outset. Globally the programme provides key stakeholders access to information required to build safer schools, including global best practices, guidelines and up to date construction documents. It provides in country support to post disaster recovery planning, case studies on school safety and technical support in the areas of engineering, capacity assessments of contractors and builders, procurement and contract management and the quality assurance environment.

Impact

In the Dominican Republic, we have developed a guidance note and road map for safer school technical assistance projects to promote a long-term systematic approach to improving the safety of school infrastructure at risk from natural hazards.

PARTNERS:

World Bank

GEOGRAPHY:

Dominican Republic

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE CARIBBEAN

Trinidad & Tobago National Public Health Laboratory

About

Arup was asked to provide technical expertise for the design of a combined, regional and national public health laboratory facility to be built in Port of Spain, to ensure a high quality, energy-efficient design, responsive to its users.

Impact

Arup created a consolidated design brief for the facility that shows a clear vision of the spatial and technical aspects to be developed in later stages of design. The Facility aims to bring together facilities from the Caribbean Public Health Agency and the Ministry of Health of Trinidad & Tobago, providing the space and facilities to offer a 24-hour service in public health for the country and the region.

PARTNERS:

United Nations Office for Project Services (UNOPS)

GEOGRAPHY:

Trinidad & Tobago

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE CARIBBEAN

Turks and Caicos Islands Building Code Update and Building Guidelines

About

The impact of natural hazards on small island nations such as the Turks and Caicos Islands can be devastating, as demonstrated by Hurricane Ike in 2008. At the same time, increasing population growth places stresses on natural resources and ecosystems making environmental sustainability an imperative. Building Codes and land use planning are recognised as important mechanisms for reducing disaster risk in areas subject to high winds and seismic activity, and promoting environmental sustainability.

The Disaster Recovery Board (DRB) of the Turks & Caicos Islands (TCI) asked Arup to update the TCI Building Code, which has not been updated for 27 years. Following this Arup was asked to develop a Building Guidelines suitable for use by artisans, contractors and self-builders to help ensure safe building practices are incorporated into non-engineered buildings in the TCI.

Impact

This project was part of wider efforts to reduce poverty following Hurricane Ike in 2008 which devastated the island; and to strengthen the resilience of affected communities in the event of future disasters
Arup updated the building code in line with the latest technology, design, and best practice towards construction in hurricane and seismic activity zones. Furthermore, we incorporated requirements to ensure best practice environmental sustainability for future development on the islands. We developed an environmental roadmap to support the TCI government to reduce risk by promoting higher environmental standards. The revised Building Code has been tested on a project to rehabilitate 150 homes, and construct up to 25 new homes. The update of the TCI Building Guidelines document was an opportunity to develop simple practical guidance e.g. on construction details, to illustrate how to apply the requirement of the new Turks & Caicos Islands Building Code to small domestic buildings.

PARTNERS:

Turks and Caicos Islands Government

GEOGRAPHY:

Turks & Caicos Islands

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE CARIBBEAN

Strategic Advice for Post-Disaster Reconstruction in Haiti

About

Over one million people were left homeless by the 2010 Haiti earthquake. Nearly 190,000 houses were damaged and 105,000 were completely destroyed. Oxfam asked Arup to conduct a safety survey of 10 buildings in use for operations in Port-Au-Prince. Arup also assisted UNOPS to refine a strategy for dealing with the earthquake derived rubble and develop an operational strategy for its removal and management.

Impact

Arup provided to Oxfam an informed structural assessment of the earthquake damage to Oxfam's main office. Safety surveys were carried out of ten other buildings in use for Oxfam International operations in Port-Au-Prince.

For UNOPS Arup developed an operational strategy for the disposal of rubble, resulted from the 2010 Haiti earthquake. Field work was conducted, assessing the rubble locations, volumes, transport routes and disposal sites, plant requirements and advised on risks of contaminants, and mapped onto existing GIS databases.

PARTNERS:

Oxfam, United Nations Office for Project Services (UNOPS)

GEOGRAPHY:

Haiti

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN THE CARIBBEAN

Improving Shelter Responses to Humanitarian Crises in Haiti

About

Habitat for Humanity (HfH) and Christian Aid (CA) often respond to urgent shelter needs during emergencies. Their responses can range from provision of basic items such as plastic sheeting, nails and tools in the immediate aftermath of a disaster, to the construction of transitional shelters or large-scale reconstruction of houses. Both work through local partners, whose experience and capacity can differ widely. This can lead to significant variation in the quality, timeliness, cost-effectiveness and final result of their programmes.

Arup was asked to undertake a comprehensive shelter-specific review of their responses over a 10-year period to uncover which responses have been most effective and why. Arup undertook fieldwork to gain an in-depth understanding of HfH's programme in Haiti following the earthquake in 2010.

Impact

Arup worked provided both programme and technical support and cogenerated a strategy using a "Pathways to Permanence" framework. This holistic framework focused on supporting families to move from emergency shelter back into permanent housing. Depending on a community or household's needs after the disaster, the pathways articulate a process to re-habilitate them as effectively as possible.

Arup's study captured learning from a range of shelter assistance efforts, and identified appropriate actions that can be taken prior to a disaster to improve the resilience of communities, and enable a more rapid response to shelter needs in the aftermath of a disaster.

PARTNERS:

Habitat for Humanity International, Christian Aid

GEOGRAPHY:

Haiti

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN AIMS

Enhance Water Security and Climate Resiliency in Maldives

About

Water resource management in small island states such as the Maldives is complex given the evident effects of an ever-changing climate and limited freshwater resources.

The objective of the Maldives project was to establish integrated, climate-resilient water supply and management systems in Maldives, while promoting increased participation in development, allocation and monitoring of freshwater use at community level.

© iStock

Impact

Arup design services for a full water treatment and distribution system and targeted upgrades to the wastewater collection system on Hinnavaru Island, supported UNOPS from project brief through technical design, so that they could deliver the Enhance Water Security and Climate Resiliency in Maldives project.

PARTNERS:

United Nations Office for Project Services (UNOPS)

GEOGRAPHY:

Hinnavaru Island, Maldives

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN AIMS

Seychelles Strategic Land Use and Development Plan

About

Arup was commissioned to prepare a strategic plan for Seychelles, articulating a clear vision and strategy for the future of Seychelles up to 2040, including how places within the country will develop.

The Seychelles Strategic Land Use and Development Plan is an ambitious spatial framework which provides policy across a range of topic areas to ensure a holistic approach to managing growth is adopted. The plan plays an important role in securing economic and social development, protecting the natural environment, supporting the Seychellois identity, and ensuring climate change resilience.

Impact

Our work producing evidence based documents – including economic strategy with demographic and employment projections – has informed strategic land use and development planning. The project was underpinned by a collaborative approach which included substantial stakeholder engagement, both with key government and non-governmental stakeholders and the wider Seychellois community. A major contribution to the project was derived from 'charrettes'. These three to five day intensive workshops brought together nearly 400 wide-ranging stakeholders – including Ministries, elected representatives, community organisations and businesses – to shape the plan. This was the first time these organisations had all come together at the same time, and has established enduring relationships.

PARTNERS:

Government of Seychelles / Abu Dhabi Urban Planning Council

GEOGRAPHY:

Seychelles

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

OUR WORK IN AIMS

Dhuvafaaru Island tsunami resettlement study in the Maldives

About

Following the devastation of Kandholhudhoo Island, Maldives, by the 2004 Indian Ocean tsunami, the International Federation of Red Cross and Red Crescent Societies (IFRC), in partnership with the government, relocated the entire community to a previously uninhabited island, Dhuvaafaru. They constructed infrastructure, housing and community facilities for over 4,000 people.

Arup was asked to conduct a review to combine learning from the Dhuvaafaru Island Tsunami Resettlement Project with current best practice, in order to enhance IFRC's knowledge of the design and implementation of large scale, integrated humanitarian projects involving displaced vulnerable communities.

Impact

Arup developed a set of indicators for site selection and for 'community harmonisation' that can be used to help inform the design and implementation of future projects. We also assessed the extent to which the new Dhuvaafaru community can be considered safe, sustainable and resilient.

Although relocation is generally the least desirable option for displaced communities, our study confirmed that the decision to relocate the Kandholhudhoo community on Dhuvaafaru was well founded. Most importantly the choice of Dhuvaafaru as their new home was made collectively with the full support of the community. Our work has enhanced IFRC's knowledge of how to successfully design and implement large scale, integrated humanitarian projects involving displaced vulnerable communities. It has also contributed to an increased understanding in the sector of how to create sustainable and more resilient communities.

PARTNERS:
International Federation of Red Cross & Red Crescent Societies (IFRC)

GEOGRAPHY:
Republic of Maldives

SERVICES:

SUSTAINABLE DEVELOPMENT GOALS:

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