

Acknowledgement: Most of this material is freely available via the internet, and some is from Quasar Management Services and Partner Housing Australasia. We thank the University of Sydney for fruitful collaboration over several years.

Humanitarian Engineering

Introductory Level Training – Workbook

This workbook has been prepared by Quasar Management Services Pty Limited, as a guide for use by not-for-profit NGOs in South Pacific village applications.



Quasar Management Services Pty Limited
ABN 21 003 954 210
Not-for-profit consulting structural and civil engineer
Subsidiary of Partner Housing Australasia (Building) Incorporated
69 Renwick Street, Redfern NSW 2016, Australia
Phone: +61 432 611 550
Email: RodJohnstonAUS@gmail.com

Rural Sanitation Training – Introductory Level

Purpose

The purpose is to provide introductory level understanding of humanitarian engineering to trainees, and to undertake more advanced tertiary level training. Enrolment at University of Sydney is recommended.

Workbook

- This workbook is for basic skills training for the construction of South Pacific village infrastructure.
- The workbook employs photographs and diagrams where possible, with minimum use of text.
- More detailed training packages are available for higher level training.
- The trainee is encouraged to make notes in the space provided.

Trainer

The Trainer must be an experienced engineer, who has received instruction in the use of this material.

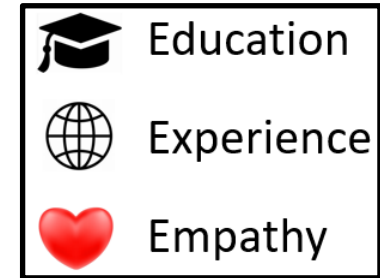
Training Resource Material

This material is sourced from Power Point presentations, that can be used as:

- Teaching presentations
- Printed work books, to be given to the trainees as a permanent reference
- Printed and laminated posters, that are placed on site
- As a source of details, which can be copied and placed onto project drawings.

Education, Experience, Empathy

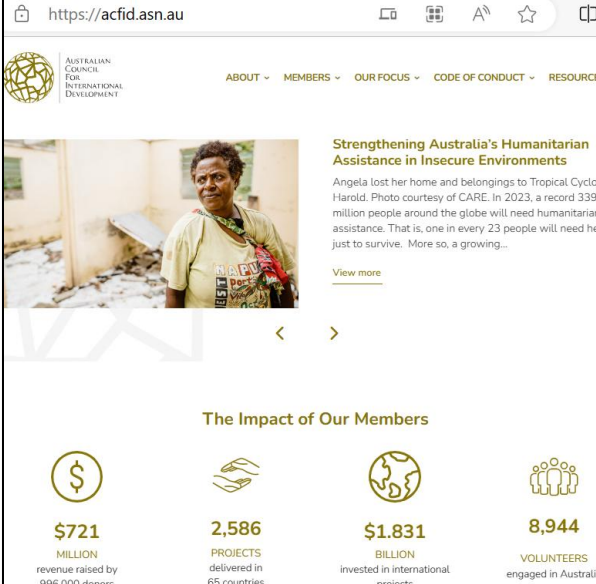
- Education is what we do in training sessions. It provides a unique set of skills for helping others.
- Experience is the accumulation, during your career, of knowledge, insights and practices, that can make your contribution meaningful.
- Empathy is what motivates us to help others. It cannot be taught, and it cannot be learned. But it can be inspired, and that is our aim.



Pathways to Practical Humanitarian Engineering

1. Full-time Management Role with a Large NGO

Check ACFID website <https://acfid.asn.au/>
Australian Council For International Development



https://acfid.asn.au

AUSTRALIAN COUNCIL FOR INTERNATIONAL DEVELOPMENT

ABOUT MEMBERS OUR FOCUS CODE OF CONDUCT RESOURCES

Strengthening Australia's Humanitarian Assistance in Insecure Environments

Angela lost her home and belongings to Tropical Cyclone Harold. Photo courtesy of CARE. In 2023, a record 339 million people around the globe will need humanitarian assistance. That is, one in every 23 people will need help just to survive. More so, a growing...

View more

The Impact of Our Members

\$	Hand	Globe	Group of people
\$721	2,586	\$1.831	8,944
MILLION revenue raised by 996,000 donors	PROJECTS delivered in 65 countries	BILLION invested in international projects	VOLUNTEERS engaged in Australia

2. Professional Career with a Specialist Development Firm



Quasar Management Services Pty Limited
ABN 21 003 954 210
Not-for-profit consulting structural and civil engineer
Subsidiary of Partner Housing Australasia (Building) Incorporated
69 Renwick Street, Redfern NSW 2016, Australia
Phone: +61 432 611 550
Email: RodJohnstonAUS@gmail.com

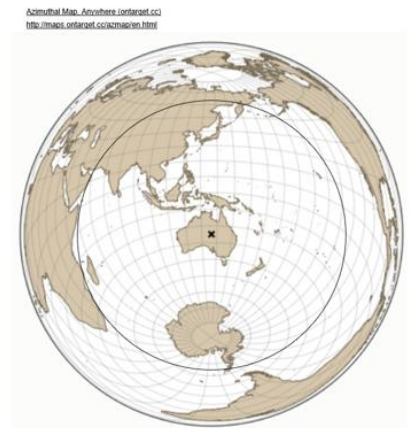
3. Volunteer Probono Services to an NGO



Partner Housing Australasia (Building) Incorporated
ABN 88 722 057 429 CFN: 15429
Web: www.partnerhousing.org
Pro-bono professional services and funding for South Pacific village infrastructure, housing, water, sanitation and training.
69 Renwick Street, Redfern NSW 2016, Australia
Phone: +61 432 611 550
Email: partner.housingaus@gmail.com

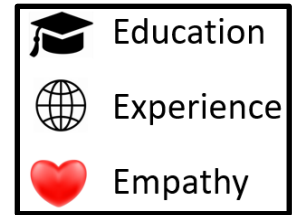
Partner Housing Australasia

Partner Housing Australasia is an entirely voluntary organisation, which aims to transform the lives of people living in Asia-Pacific villages by improving the cyclone, earthquake and tsunami resistance of their houses, clinics, schools and community buildings; and by providing clean water supplies and hygienic sanitation.



“What we do makes a difference!”

Over 30 years ago, this group came together to travel and learn of NGO microfinance activity (through Opportunity International programs) in South-East Asia. Most of these people went on to continue serving humanitarian causes in leading roles in NGOs and other influential positions for many years, including Partner Housing Australasia and Quasar Management Services.



[David Bussau & Our History | Opportunity International Australia](#)

Refer also to:



“What we do makes a difference!”

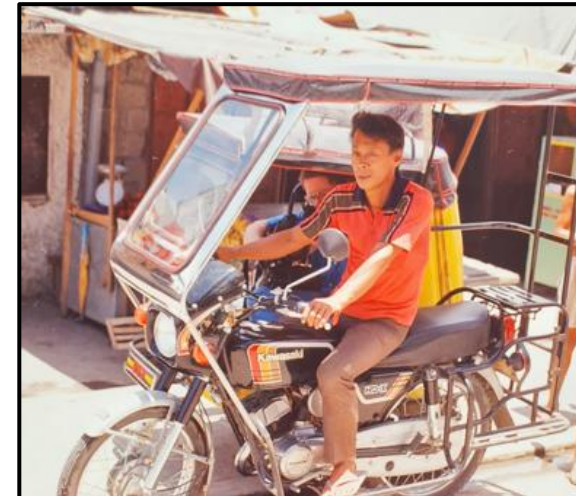
Microfinance Example – Opportunity International

Principles

1. Initially, “relieve poverty, irrespective of cost” (charity).
2. When scaling-up, provide commercially viable banking services to micro businesses.
3. Donor support for one business should not be at the expense of another competitor.
4. Microfinance should involve mandatory saving.

Process

1. Start small, usually as an NGO with donor support.
2. Establish a sustainable market providing credit to the poor.
3. Operate efficiently (and perhaps, profitably)
4. Scale-up.
5. Operate with reduced reliance on subsidies and grants.
6. Occasionally acquire the status of formal banks.



Beyond your comfort zone - Tsunami



Tsunami – Solomon Islands 2007



Tsunami – Solomon Islands 2007



Tsunami – Indonesia 2004



Tsunami – India 2004



Tsunami – Sri Lanka 2004



Tsunami – Sri Lanka 2004

Beyond your comfort zone – Disaster Mitigation



Beyond your comfort zone – Cyclone

Cyclone – Fiji 2016

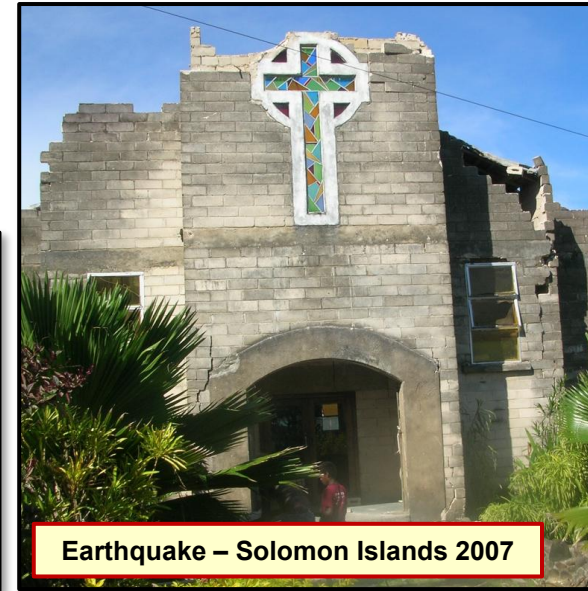


Cyclone – Tonga 2014



Beyond your comfort zone – Earthquake

Earthquake – PNG 2018



Earthquake – Solomon Islands 2007

Earthquake – Indonesia 2004



Beyond your comfort zone – Fire, Famine, Drought

Koolewong Fire – Australia 2025

Photo credit: NT News
<https://www.ntnews.com.au/>



Beyond your comfort zone – War and Civil Violence



Beyond your comfort zone – Natural Disasters



Let us pause for a moment,
and remember those killed in
natural disasters (ordinary
people like you and me) in the
wrong place at the wrong time.

Points to Ponder

- 1. Is Humanitarian Engineering concerned with –**
 - reducing poverty,
 - improving living standards (water, sanitation, shelter, health, and education),
 - or both?

- 2. An NGO constructing infrastructure may improve the living standards without relieving poverty.**

Recommended Readings

Following is a list of readings, recommended by the University of Sydney –

- [1] Elliott, J. A. (2013). “What is sustainable development?” *An Introduction to Sustainable Development*, Routledge, New York, 8–56.
- [2] Haan, A. de. (2009). “The Evolution in Thinking about Aid and International Development.” *How the Aid Industry Works: An Introduction to International Development*, Kumarian Press, Sterling, 63–89.
- [3] Martin, C. E. (2016). “Western do-gooders need to resist the allure of ‘exotic problems (Links to an external site.)’” *The Guardian*.
- [4] Sen, A. (1999). “Introduction: Development as Freedom.” *Development as Freedom* (Links to an external site.), Oxford University Press, Oxford, 3–11.
- [5] Easterly, W. (2006). “Planners versus Searchers.” *The White Man’s Burden: Why the West’s Efforts to Aid the Rest Have Done So Much Ill and So Little Good* (Links to an external site.), Penguin, New York, 3–33.
- [6] Collier, P. (2008). “The Traps.” *The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It* (Links to an external site.), Oxford University Press, New York, 15–75.
- [6] Moyo, D. (2009). “The Myth of Aid.” *Dead Aid: Why Aid Is Not Working and How There Is a Better Way for Africa* (Links to an external site.), Farrar, Straus and Giroux, New York, 3–9.
- [7] Davey, E., Borton, J., and Foley, M. (2013). *A History of the Humanitarian System: Western Origins and Foundations* (Links to an external site.). Working Paper, Humanitarian Policy Group Overseas Development Institute, London.

Sustainable Development Goals

- 1 No Poverty** – By 2030, eradicate extreme poverty for all people everywhere.
- 2 Zero Hunger** – End hunger, achieve food security & improved nutrition by 2030.
- 3 Good Health & Well-being** – Ensure healthy lives & promote well-being for all at all ages by 2030.
- 4 Quality Education** – Ensure that all girls & boys complete free, equitable & quality primary & secondary education by 2030.
- 5 Gender Equality** – To achieve gender equality & empower all women and girls.
- 6 Clean Water & Sanitation** – Ensure availability & sustainable management of water and sanitation for all by 2030.
- 7 Affordable & Clean Energy** – Ensure access to affordable, reliable, sustainable & modern energy for all by 2030.
- 8 Decent Work & Economic Growth** – Promote sustained, inclusive & sustainable economic growth.
- 9 Industry, Innovation & Infrastructure** – Build resilient infrastructure, promote inclusive & sustainable industrialization & foster innovation by 2030
- 10 Reduced Inequality** – Reduce inequality within & among countries by 2030.
- 11 Sustainable Cities & Communities** – Make cities & human settlements inclusive, safe, resilient & sustainable.
- 12 Responsible Consumption & Production** – Ensure sustainable consumption & production patterns.
- 13 Climate Action** – Take urgent action to combat climate change & its impacts.
- 14 Life Below Water** – Conserve & sustainably use the oceans, seas & marine resources for sustainable development.
- 15 Life on Land** – Protect, restore & promote sustainable use of terrestrial ecosystems, combat desertification & halt biodiversity loss.
- 16 Peace and Justice Strong Institutions** – Promote peaceful and inclusive societies for sustainable development; provide access to justice for all.
- 17 Partnerships to achieve the Goal** – Strengthen the means of implementation & revitalize the global partnership for sustainable development.

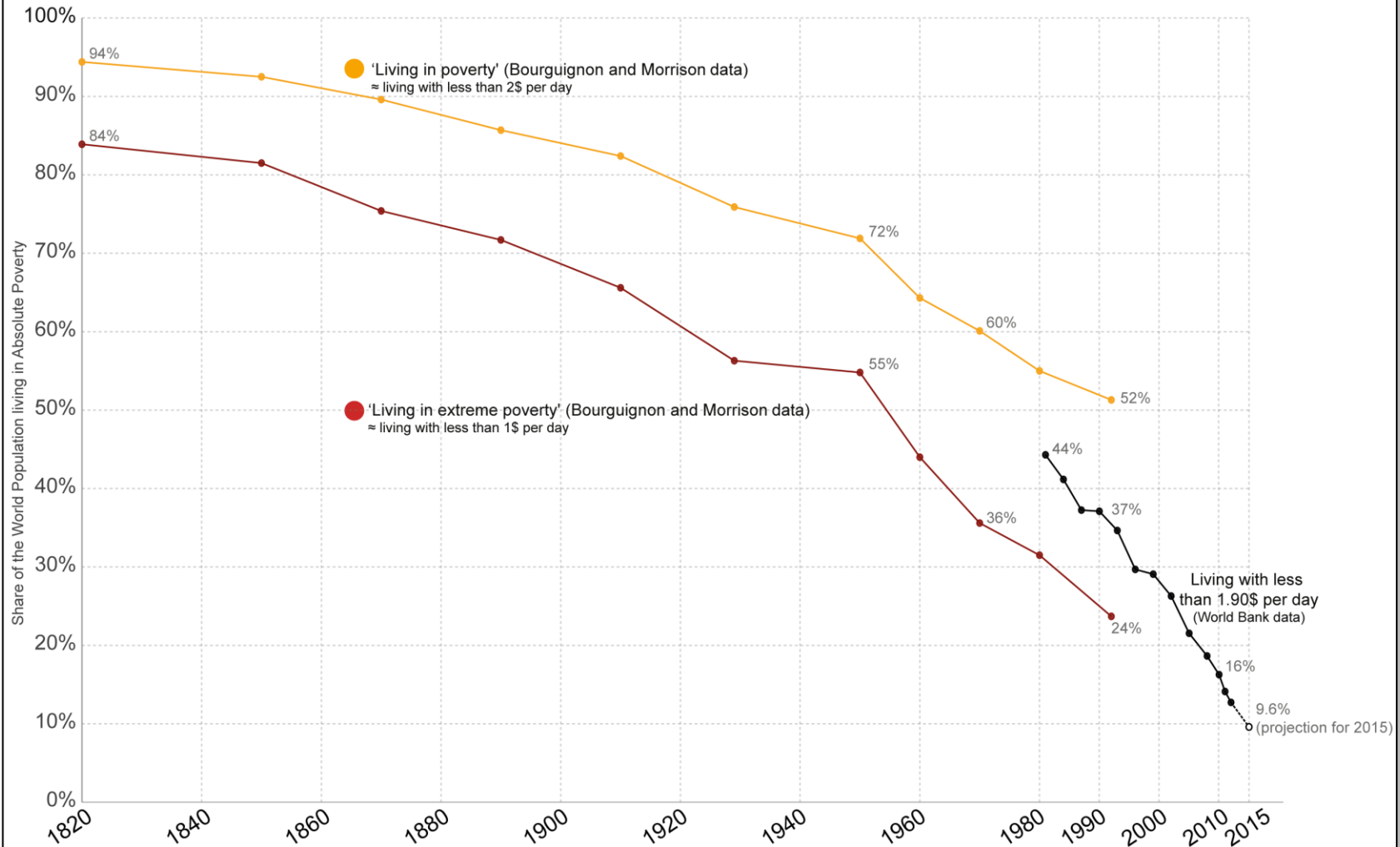


Development Gains

Our World
in Data

Share of the World Population living in Absolute Poverty, 1820-2015

All data are adjusted for inflation over time and for price differences between countries (PPP adjustment).



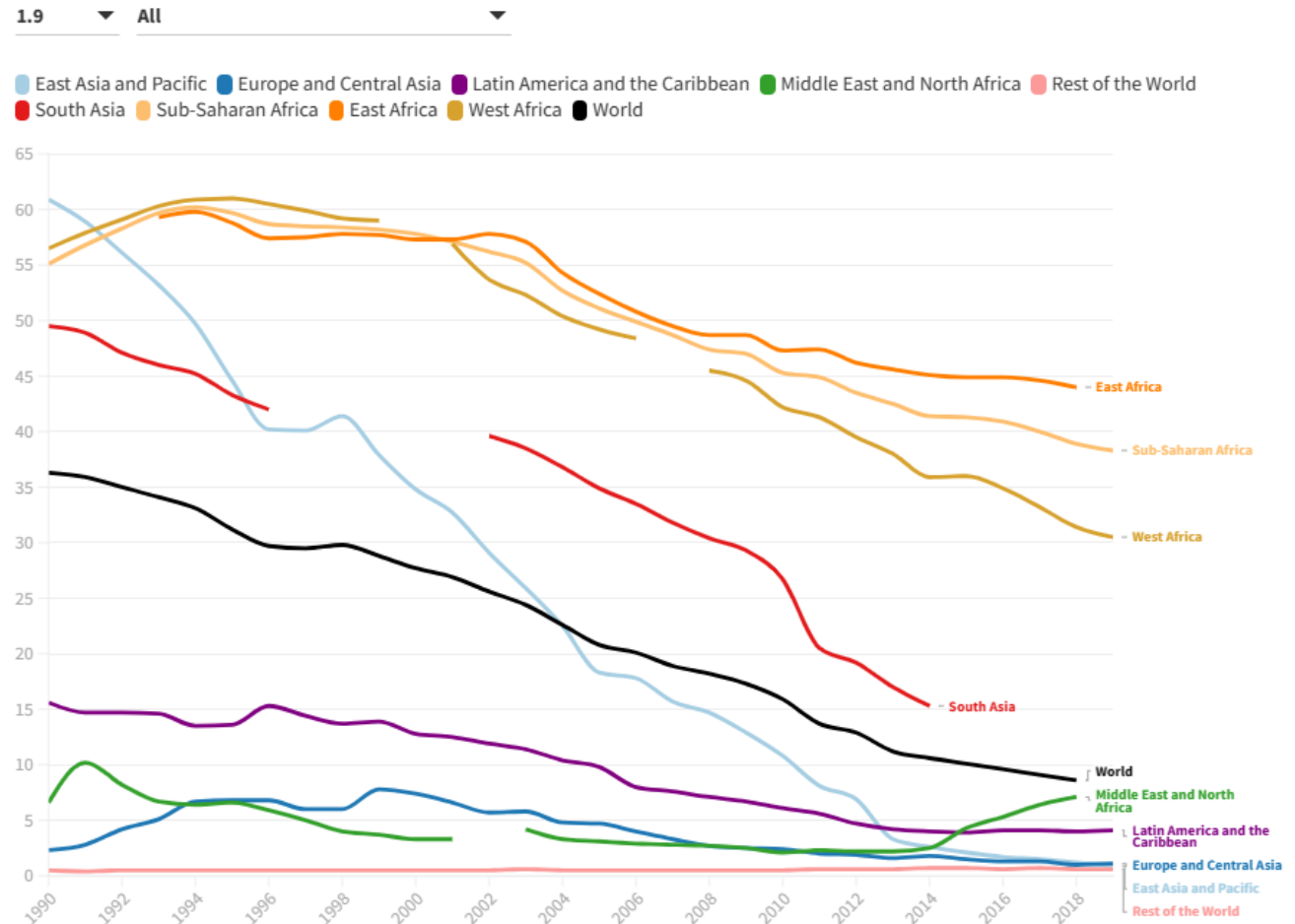
Data sources: 1820-1992 Bourguignon and Morrison (2002) - Inequality among World Citizens, In The American Economic Review; 1981-2015 World Bank (PovcalNet)

The interactive data visualisation is available at OurWorldinData.org. There you find the raw data and more visualisations on this topic.

Licensed under [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) by the author Max Roser.

Reduction in Poverty

Figure 1: Global and regional poverty trends at different poverty lines, 1990-2019



Source: PIP •

Regional and global poverty estimates are reported if the available survey data account for at least 50% of the population within a three-year window of the reference year. In addition, the global estimate is only reported if at least 50% of the population in low- and lower-middle-income countries is covered. Details on population coverage rule are available [here](#)

Improvements in peoples' health and income in 200 countries over 200 years

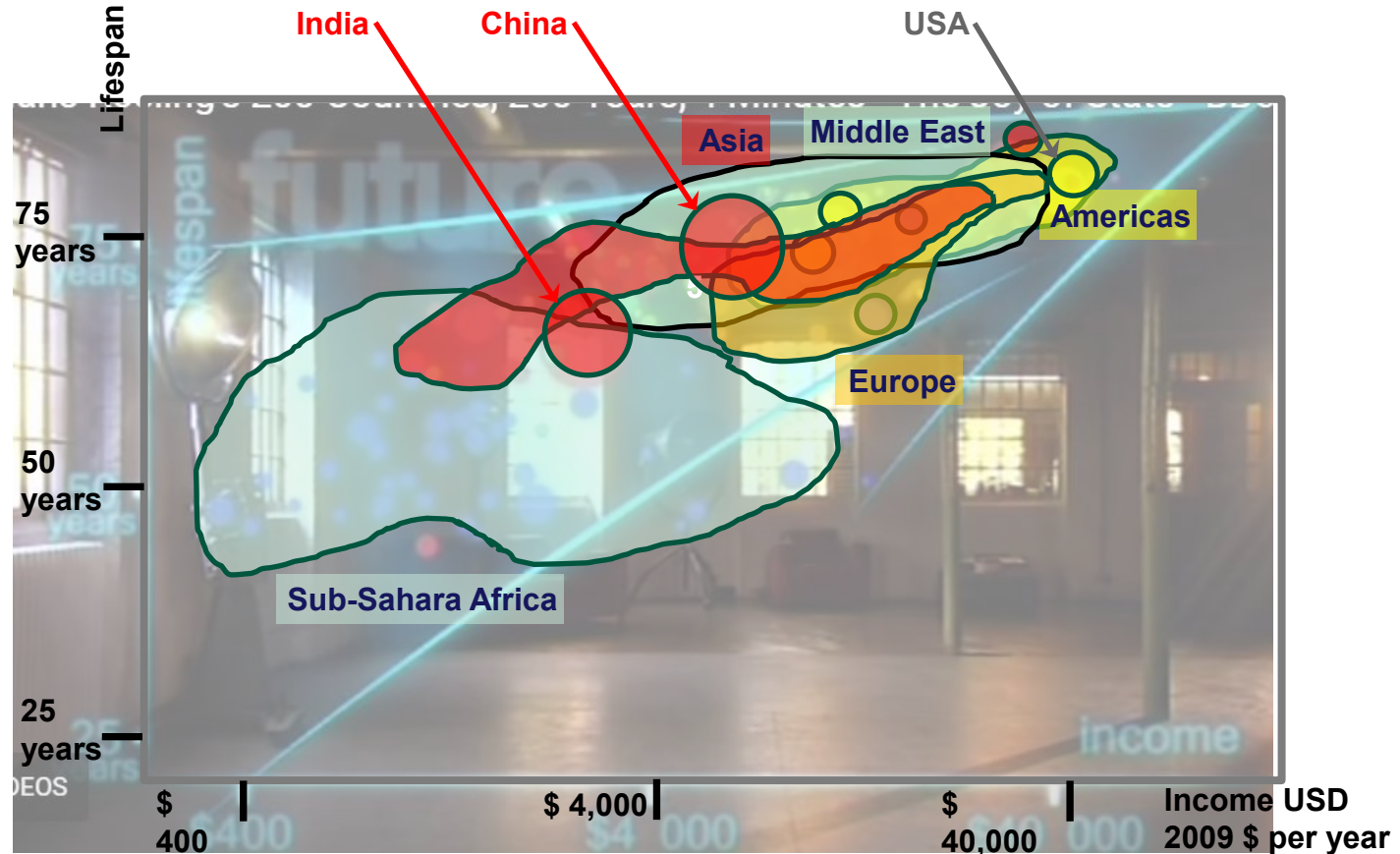
Shown below is a BBC video demonstrating the gradual improvements in living standards (life expectancy [vertical axis] and income [horizontal axis]) in 200 countries over 200 years.

This video cannot be accessed from a pdf. It is recommended that (if possible) you view it on the internet.

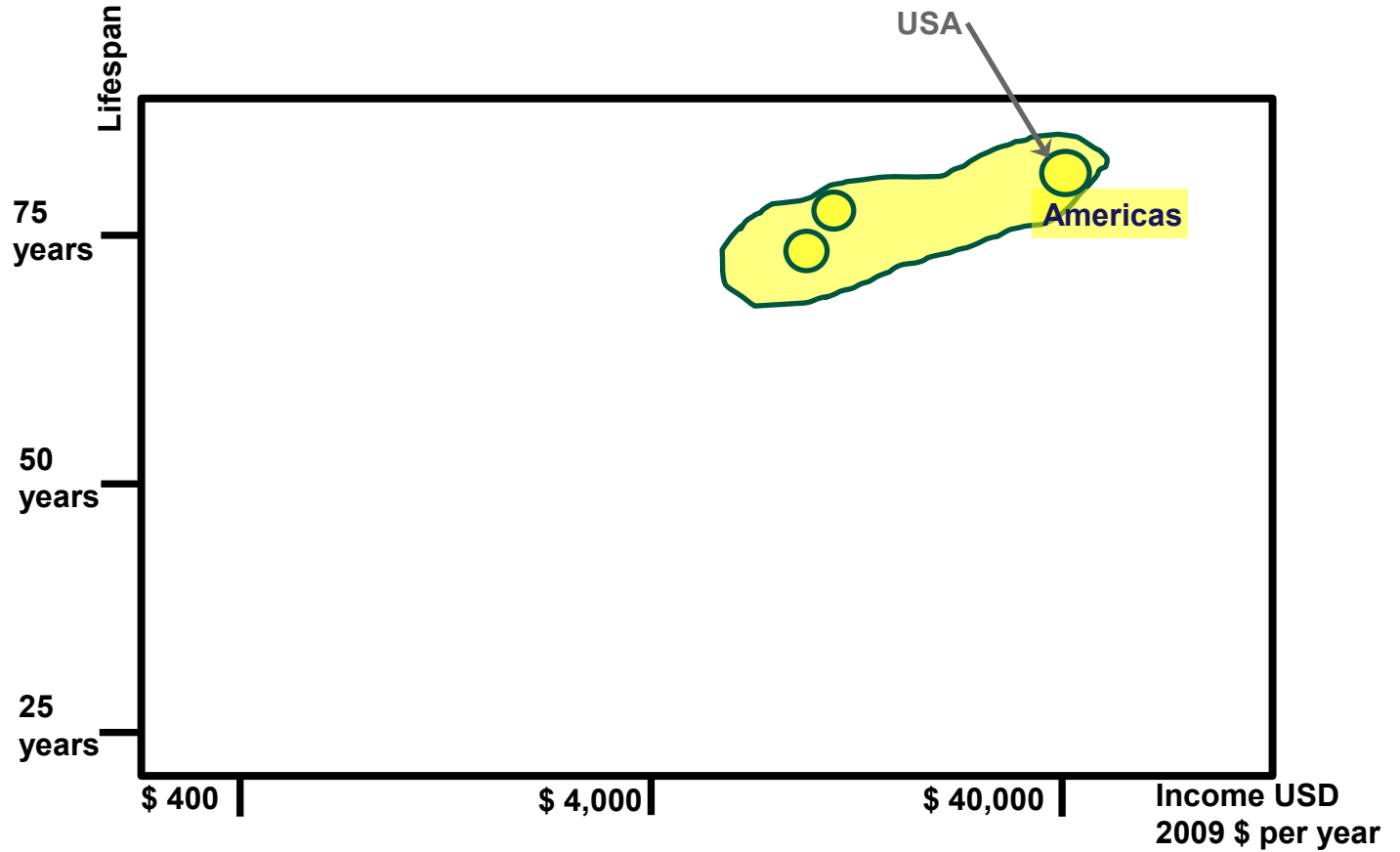
Improvements in peoples' health and income in 200 countries over 200 years

The video shows that, over 200 years, all 200 countries have experienced a general increase life expectancy [vertical axis] and income [horizontal axis]).

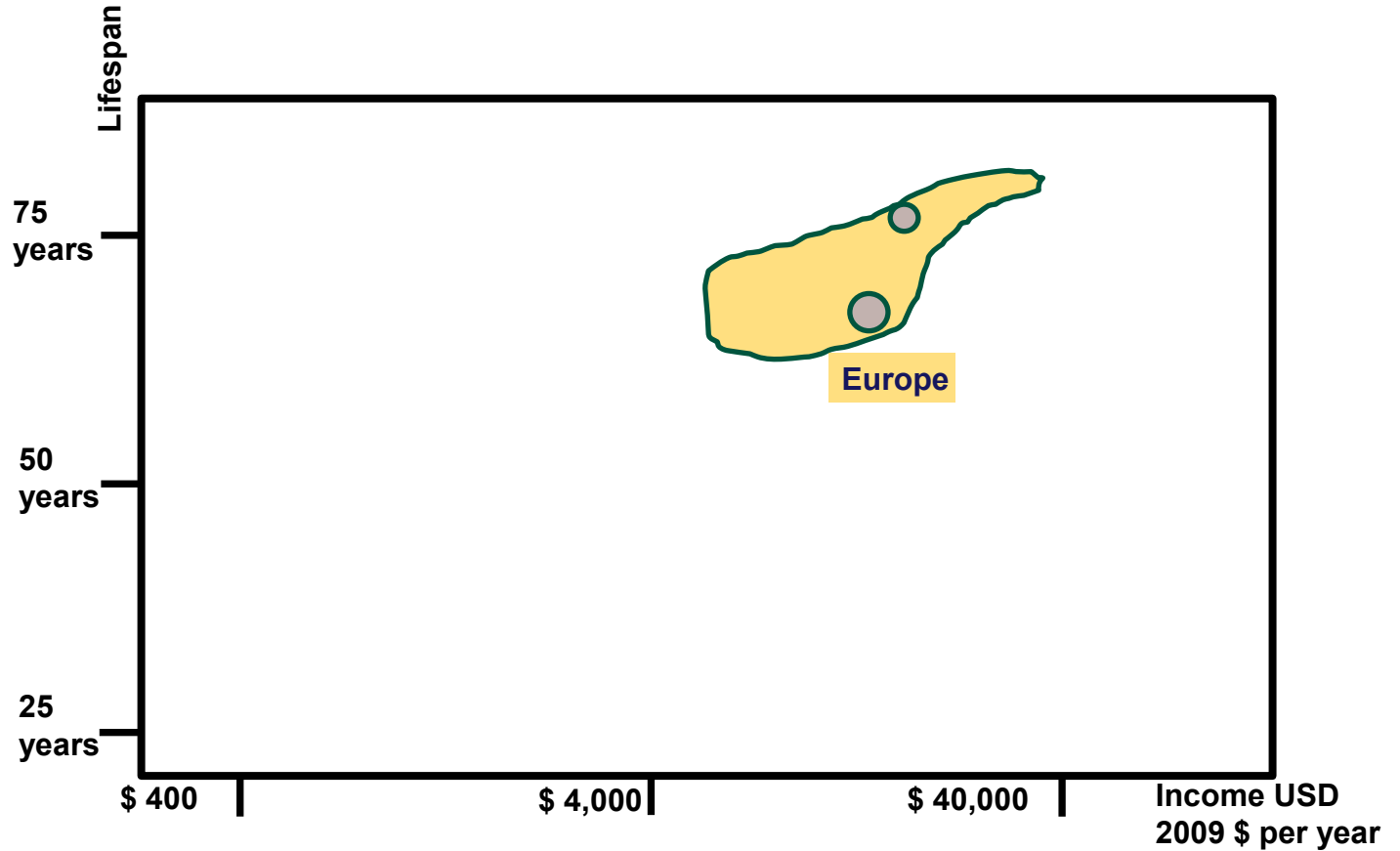
The video shows that the improvements were initially rapid in Europe (brown) and North America (yellow). In more recent times, the Middle-East (aqua) and the Asian countries (red) have substantially caught up, but Sub-Saharan Africa (blue) mostly remains relatively poor and with low life expectancy. This is the data at the end of the period in 2010.



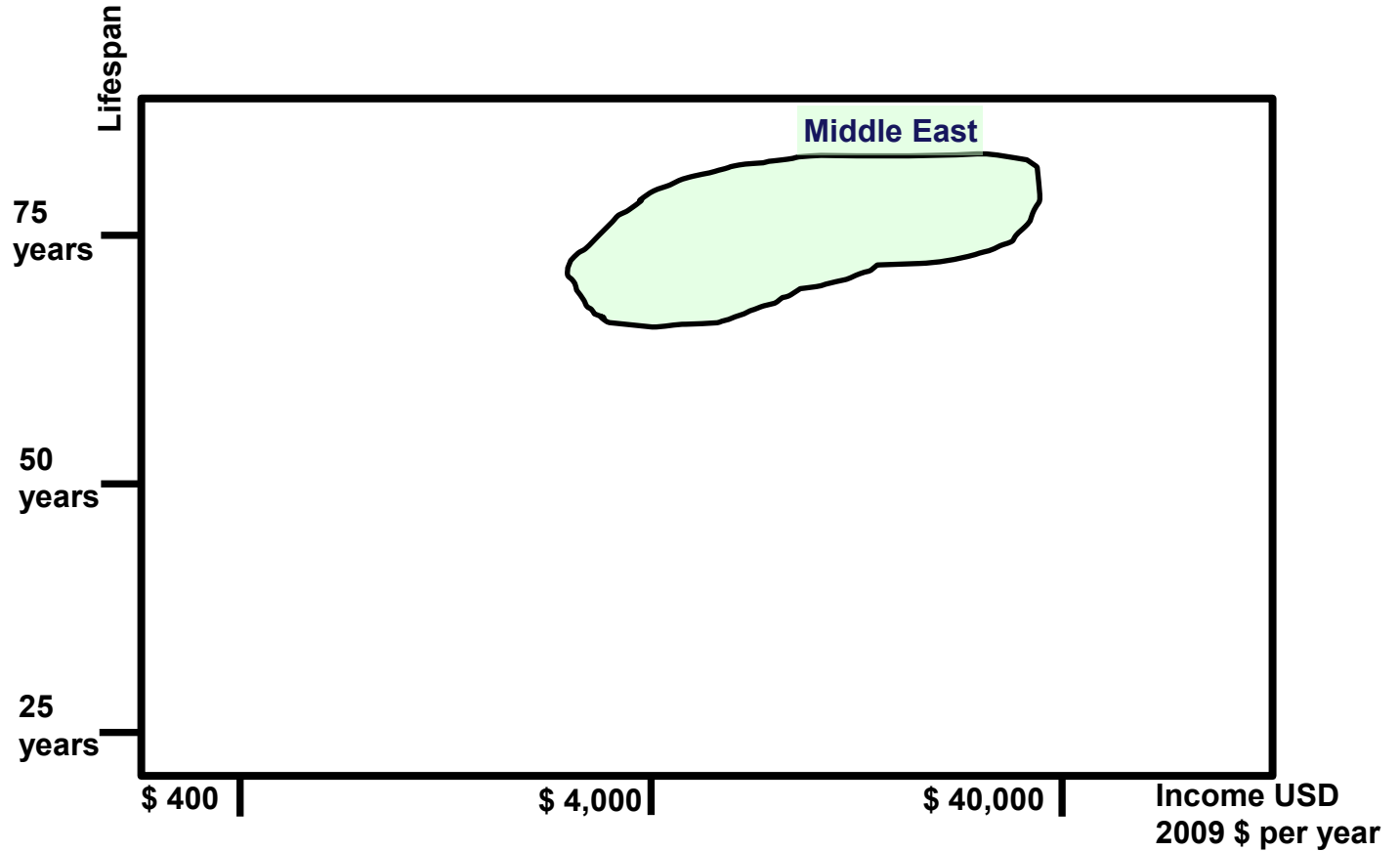
Health and income in the Americas in 2010



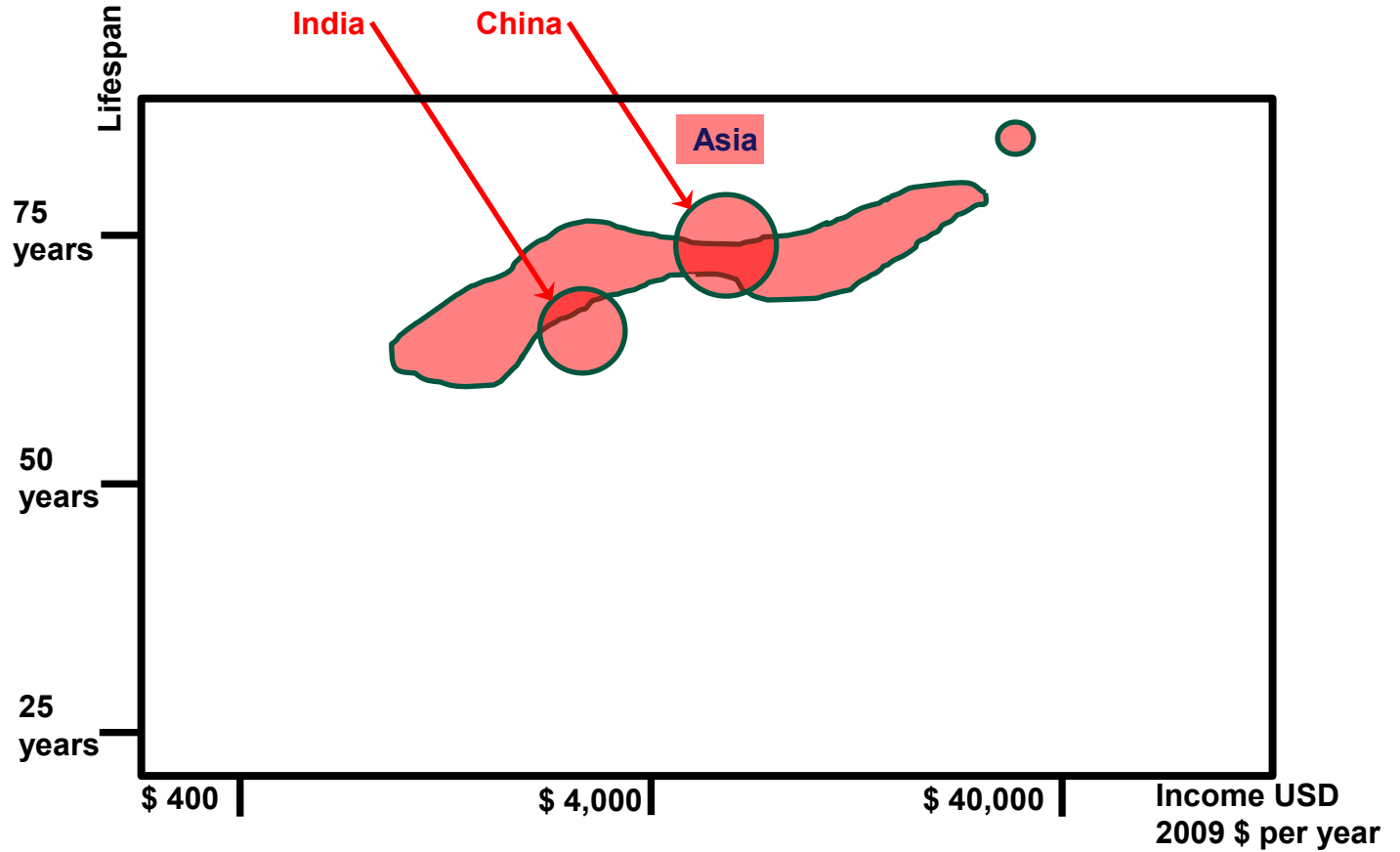
Health and income in Europe in 2010



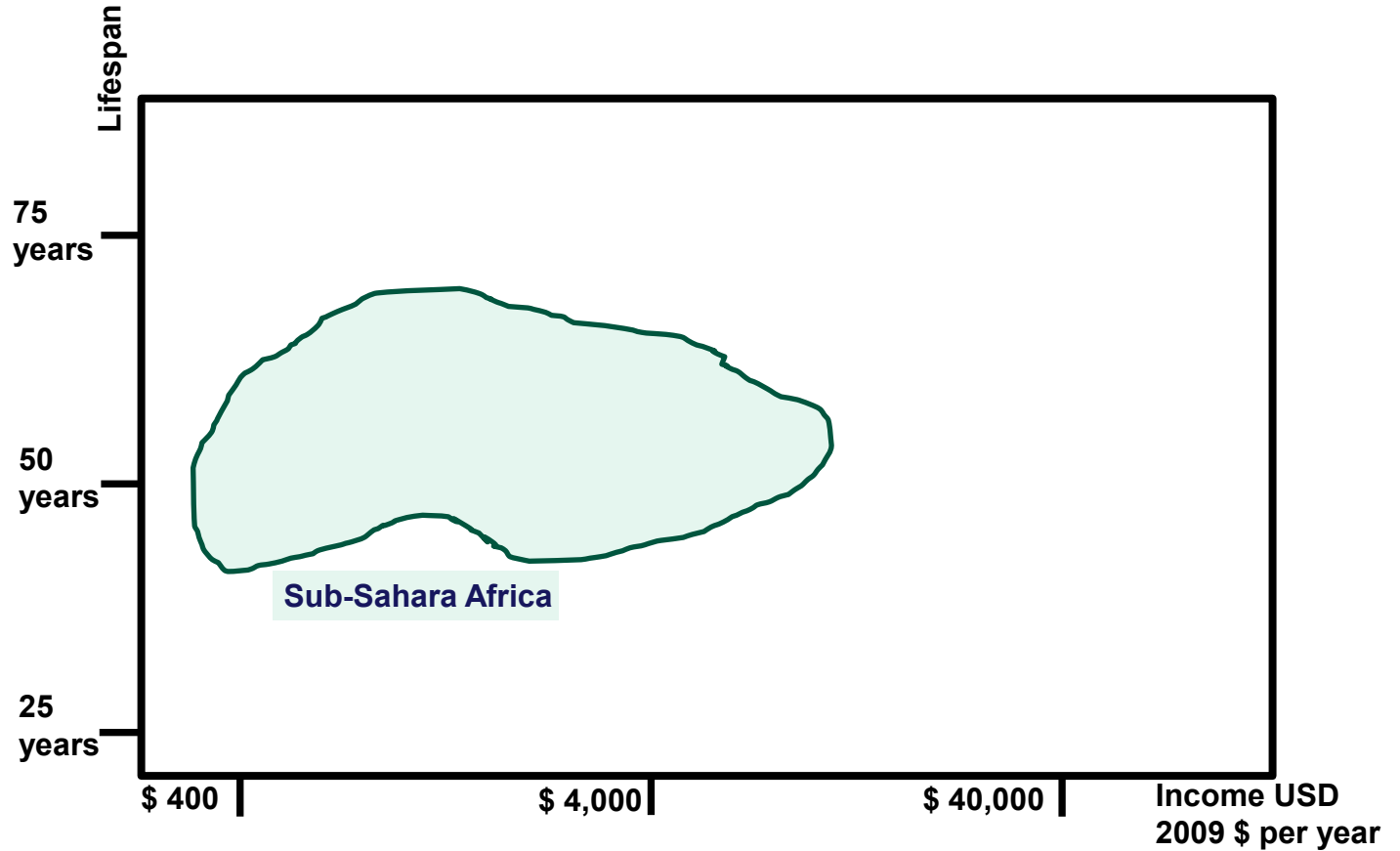
Health and income in the Middle East in 2010



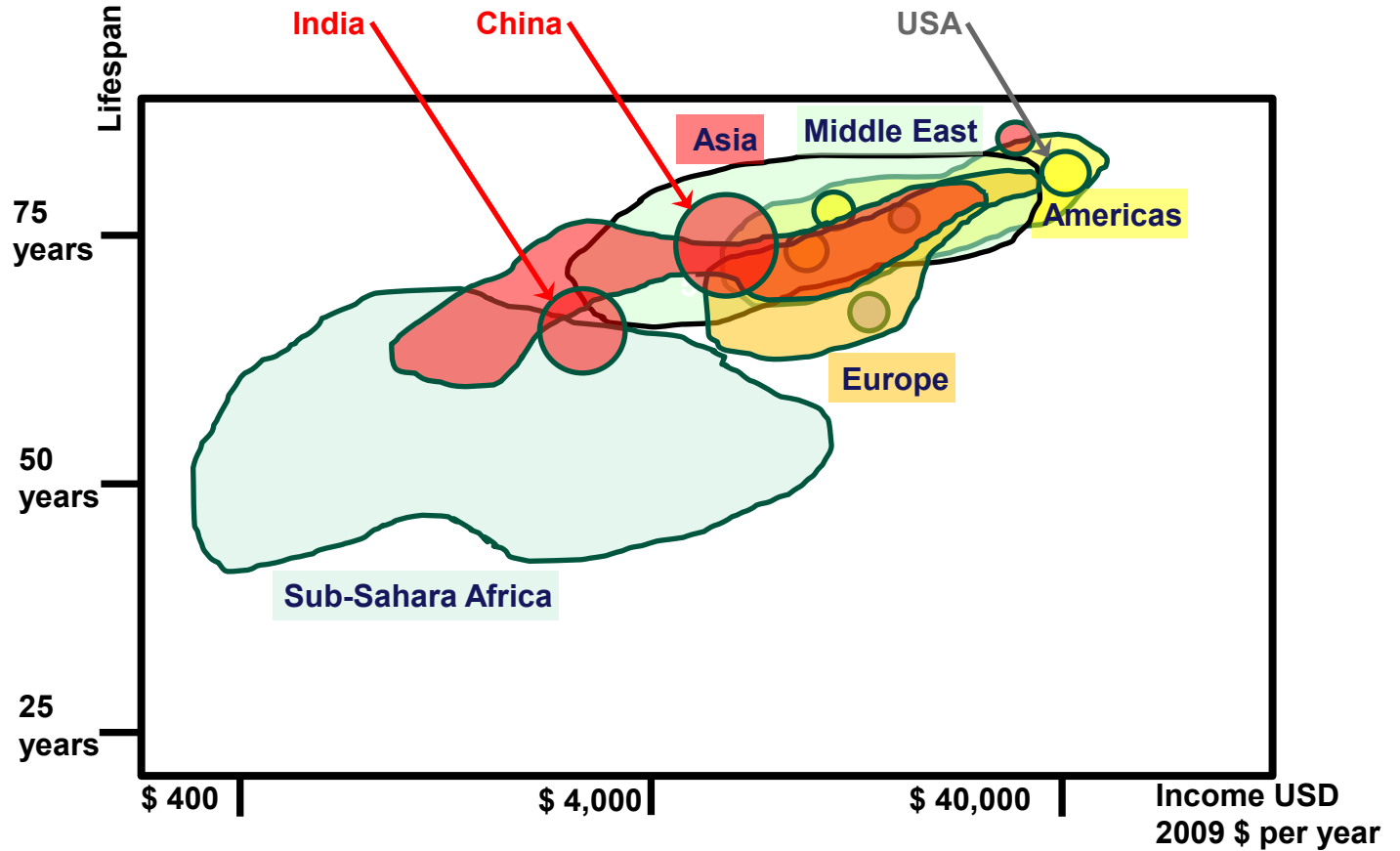
Health and income in Asia in 2010



Health and income in Sub-Saharan Africa in 2010



Health and income in 200 countries in 2010



Points to Ponder

When studying the readings, pause and give thought to the following questions and propositions.

1. “Poor” Australians have access to water, sanitation, shelter, health, and education, but they are considered poor because they have less disposable income than “rich” Australians.

Is this also the situation in developing countries?

Is poverty absolute, or is it relative to a particular environment?

2. In urbanised high-income countries (like Australia), the concentration of rural land ownership does not impoverish the urban dwellers.

Is there a natural progression (as urbanisation proceeds) from small scale subsistence farming towards the concentration of land ownership for commercial exploitation?

If so, does this increase or decrease poverty?

3. Does “trickle down” work?

If so, under what circumstances?

Recommended Reading

Following is a list of readings, recommended by the University of Sydney –

- [1] Laderchi, C. R., Saith, R., and Stewart, F. (2003). “Does it Matter that we do not Agree on the Definition of Poverty? A Comparison of Four Approaches.” *Oxford Development Studies*, 31(3), 243–274.
- [2] Shepherd, A., Scott, L., Mariotti, C., Kessy, F., Gaiha, R., de Cora, L., Hanifnia, K., Kaicker, N., Lenhardt, A., Lwanga-Ntale, C., Sen, B., Sijapati, B., Strawson, T., Thapa, G., Underhill, H., and Wild, L. (2015). *The Chronic Poverty Report 2014-15: The Road to Zero Poverty*. Chronic Poverty Advisory Network, 1–9.
- [3] Krishna, A., Kristjanson, P., Kuan, J., Quilca, G., Radeny, M., and Sanchez-Urrelo, A. (2006). “Fixing the hole in the bucket: household poverty dynamics in the Peruvian Andes.” *Development and Change*, 37(5), 997–1021.
- [4] Saunders, P. (2011). “Down and out in Australia: the new way to define poverty.” *The Conversation*

Local Participation

To effectively improve life
in developing countries ...

- **Go**
- **Listen**
- **Learn**
- **Befriend**
- **Commit**
- **Develop professionally**
- **Offer your expertise**



Some Acronyms and Definitions

The following acronyms are often used in regards local participation in development project planning and implementation.

RRA is Rapid Rural Appraisal

PRA is Participatory Rural Appraisal

MEAL is monitoring, evaluation, accountability and learning in developing community contexts

Project is a discreet undertaking (e.g. construction of a school building).

Program is the collective undertaking of a number of “projects”, each sharing similar objectives but differing in some minor way, such as location. A number of “projects” comprise a “program” (e.g. improvement of educational infrastructure).



Mutual Respect



The foundation ... is mutual respect. You must acknowledge what you do not know and open yourself up to two-way learning. ... the clients / end users bring their knowledge of their cultural world to the design process ... what the design team lacks. This compliments what the design team brings to the project experience, best practice, and expertise. ... Through this each project achieves high levels of community ownership.

The process is underpinned by the following values:

1. Community led consultation.
2. Listening to all voices.
3. Time to listen.
4. First principles approach.
5. Iterative co-design.
6. Materials / art / culture.
7. Co-construct.
8. Innovation.



Points to Ponder

When studying the readings, pause and give thought to the following questions and propositions.

- **Is there a sensible balance** between **expert knowledge** and **local knowledge**?
(Chambers)
- **Does rigid PRA** (Participatory Rural Appraisal) impose outcomes that are not necessarily in the best interest of the beneficiaries? (Cooke & Kothari)
- **Respect** and **Friendship develop over time.** They cannot be imposed.
 - **Who** participates in your projects?
 - **How** do they participate?
 - **What** does their participation mean?
 - **Is it equitable?**

Who are you designing for?

Does your project perpetuate systemic issues or address them?

Recommended Reading

Following a reading, recommended by the University of Sydney –

1. Chambers, 1997, *What Works and Why*
2. Cooke, B., and Kothari, U. (2001). *Participation: The New Tyranny?* Zed Books, London

Extract from Chambers, 1997, “What Works and Why”

analysis from the beginning to be on paper. Some have argued, before the experience, that the ground is an insult to people who are educated, and that it is patronizing for a facilitator to encourage use of the ground. Cultures and conditions vary but to date these reservations have proven unfounded. Ground and paper both have pros and cons, summarized in Table 7.4.

Table 7.4: The advantages of ground and of paper

<i>Ground</i>	<i>Paper</i>
Democratic, less eye contact and dominance	Permanent
Inclusive, more can take part	Portable
Friendly for marginalized people – non-literates, women etc	Easy to copy
Easy to alter and add to	Easy to display
Size less limited	Updatable
Wide range of materials	Usable for participatory monitoring and evaluation
Can be 3-dimensional	More authoritative (with officials, policy-makers etc.)
Fun and creative	
Local ownership	

Reversals of power: from extracting to empowering

PRA seeks and stresses power reversals between uppers and lowers. Initiative and control are passed to local people, using the metaphor (and sometimes reality) of ‘handing over the stick’ (or chalk, or pen). The shifts have built-in tendencies towards reversals of power from outsiders as uppers to local people as lowers:

- *from closed to open* restrains the normal dominance of the etic, and encourages expression of emic reality;
- *from measuring to comparing* enables the expression and analysis by people of realities and preferences which are otherwise inaccessible (because not measured or measurable) or sensitive (when expressed in absolute rather than relative terms);
- *from individual to group* shifts the balance of power, with a lower ratio of outsiders to insiders;
- *from verbal to visual* empowers local people, and lowers within a community, to express their reality – those who do not speak up, the marginalized, those who do not read or write, women, children, those of low social status;
- *from paper, table and wall to ground* reduces the dominance of the few who hold pens, sit at tables, or stand at the wall, and encourages and enables more to participate, including those who speak less and who are less literate. The ground empowers the weak, and brings the strong down to the same level. There is less eye contact, less use of words, and greater ease of action;
- *from reserve to rapport and from frustration to fun* help outsiders facilitate analysis by insiders and release social energy.

The people in these photographs have given permission for their photograph to be used for training purposes.

Practical Participation – Solomon Islands

Consultation with village residents is essential to determine the required function, location and commitment to maintenance of village water supplies.



Kudu Village Water Supply
57 people (recorded on the attendance list) attended this pre-construction village meeting and posed for this photograph, on the understanding that their photo would be published for training purposes. Notwithstanding this permission, their faces (except for the SRCA supervisor) are obscured for enhanced privacy.



Local Leadership



Local Skills



Practical Participation – PNG

Consultation with village residents, school principals and their staff, and health professionals is essential to determine the required function, location and external features of community buildings, education and health buildings (respectively), that are constructed as part of externally funded development programs. Detailed local input is also required regarding the internal fit-out.

Village meetings, staff meetings and training sessions provide ideal opportunities to exchange information and expertise.



Needs Assessment, Project Appraisal, Monitoring & Evaluation

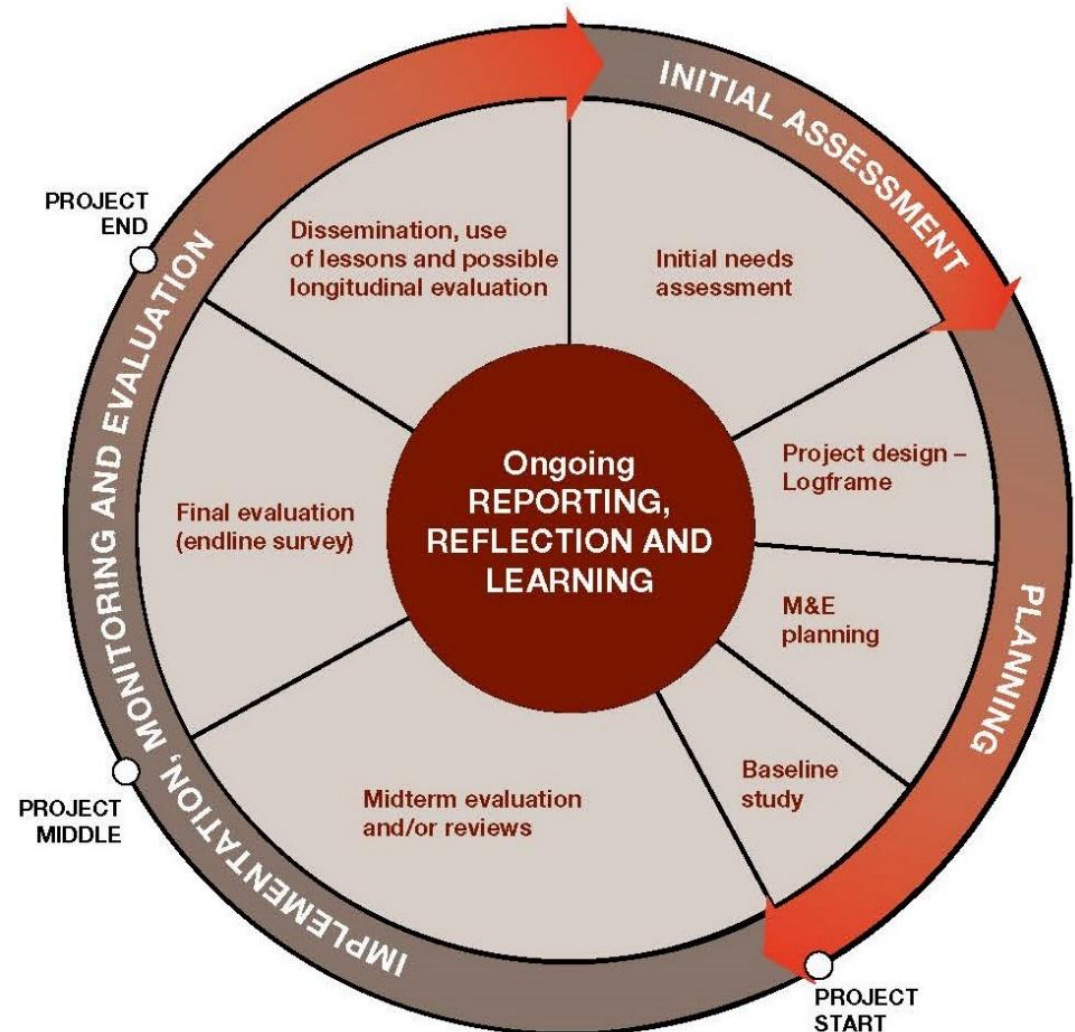
The 2023 construction of Kenembo School Classrooms and Office by Vision for Homes (PNG) gives practical examples of the Needs Assessment, Project Appraisal, Monitoring & Evaluation processes.



Project Management Process

The projects management process involves the following process –

1. Initial Assessment
2. Planning
3. Implementation
4. Monitoring
5. Evaluation
6. Accountability
7. Learning



Credit: IFRC

Analysis, Goals, Objectives, Outputs, Outcomes and Activities

Needs Assessment, Analysis, Goals and Objectives

Needs Assessment – This is the determination and documentation of the reasons for embarking on the program and the projects. It can only be sensibly determined through consultation with all stakeholders.

Analysis – The first step in any program is to analyse the situation, based on the information derived during the consultation process. This includes identification of the main strengths, interests, needs, constraints and opportunities of the implementing team and of key stakeholders, and identifying the problems that need to be solved and their causes and consequences.

Goals – Goals are the organisation's long-term, high-level aspirations. It is important to establish the goals of the organisation very early in the process (if this has not already been done).

Objectives – Based on the Goals, the results of the Consultation, and the detailed Analysis, determine specific Program Objectives (for the overall program) and Project Objectives (for each individual project within the program). This process involves identifying the different project options available to achieve the main program objectives, and selecting the appropriate objective most suited to the particular stakeholders.

Program and Project Design

Logical Framework Matrix (Log Frame) – The Log Frame is a method of presenting Goals, Objectives, Outcomes and Activities using a widely-used standard format. It is not the only method of presenting such information, and is certainly not the most convenient for planning and monitoring construction projects. However, it does have the advantage of being recognised by most international NGOs, and is used in this training module.

Activity scheduling – Once the Goals, Objectives and Outcomes have been determined, the next step is to schedule the Activities (those steps necessary in achieving the required Outcomes). This involves establishing the logical sequence of activities, estimating required resources and durations, establishing milestones and assigning sensible responsibilities to people (such as supervisors) with access to the information. It is here that a degree of flexibility is recommended, to ensure that the Log Frame continues to serve as a useful tool in the ongoing Monitoring, Evaluation, Accountability and Learning (MEAL) processes.

Planning and MEAL – Determine the required inputs and budget and a monitoring system.

Project Management Process

This project is the construction of two classrooms and an office for Kenembo Primary School in the PNG Western Highlands, similar to others designed and constructed by PHA, VFH and QMS. Reference is made to corresponding DFAT requirements.

Part 1 – Project Design and Preliminaries

Project Design B2.2

Contextual Analysis and Stakeholder Consultation B2.3

Standards, DFAT Requirements & Project Appraisal B2.4

Activity Risk Management B2.5

Partner Organisations and MOUs B2.6

Gender Equality B3.1

Disability Inclusion B3.2

Environmental Impact B3.3

Displacement and Resettlement B3.4

Sustainability Enhancement B3.5

Child Protection A3.1, A3.2, A 3.3

Safety and Security A2.5, A2.6

Authority to Work In-country C1.1

Partner MOU C1.2

Partner MOU Annexures including DFAT Requirements C1.3

Partner Agreement Understanding C1.4

Partner Capacity Due Diligence C2.1

Partner Capacity Assessment C2.2

Partner Non-development Activities C2.3

Project-specific Consideration of Partner Capacity C3.1

Partner Performance Monitoring C3.2

Partner Feedback and Complaints C3.3

Part 2 – Monitoring, Evaluation and Learning

Carried out progressively and on completion of the project

Field Monitoring B4.1

DFAT & Stakeholder Compliance B4.2

Project Evaluations B4.3

Part 3 – Engineering Design

Part 4 – Construction

Resourcing

Pricing

Materials Ordering

Materials Delivery and Receipt

Fabrication and Trial Erection

Transport to Site

Construction

Commissioning and Hand-over

Maintenance

Contextual Analysis and Stakeholder Consultation

PNG Kenembo School 2 Classrooms + Office

Introduction

PHA and VFH tailor their programs to respond to documented community needs, based on –

- Need Based on Requests from School Authorities
- Need Based on Isolation
- External Needs Assessment by Other Organisations, and
- Internal Needs Assessment by PHA and VFH personnel.

Need Based on Requests from School Authorities

Representatives of the Kenembo Primary School approached the VFH Manager in **January 2023**, requesting the provision of an additional two classrooms and office.

Need Based on Isolation

Kenembo Primary School is located in Dei District, in the rural part of the PNG Western Highlands Province. This area is in the remote region of the PNG Highland, and the isolation is further exacerbated by the current spate of tribal and political violence. This isolation contributes to the relative poverty of the area serviced by the school.

External Needs Assessment by Other Organisations

Overview

The following extracts published by other organisations and government agencies influence the formation of PHA and VFH programs.

“The Demographic and Health Survey (PNG DHS) provides data for monitoring the health situation of the population in Papua New Guinea. The 2016-18 PNG DHS is the first Demographic and Health Survey supported by The DHS Program. The 2016-18 PNG DHS was implemented by the National Statistical Office from October 2016 to December 2018. Funding for the 2016-18 PNG DHS was provided by the Government of Papua New Guinea (GOPNG), the Australian Government Department of Foreign Affairs and Trade (DFAT), the United Nations Population Fund (UNFPA), and the United Nations Children’s Fund (UNICEF). ICF provided technical assistance through The DHS Program, a project funded by the United States Agency for International Development (USAID) that provides support and technical assistance in the implementation of population and health surveys in countries worldwide. Key Findings of the 2016-18 DHS - Housing Characteristics and Household Population

- *Drinking water: In Papua New Guinea, less than half of households have access to an improved source of drinking water; the most common source is an unprotected spring (29% of households).*
- *Toilet facilities: Only 29% of households use improved sanitation facilities; about one in five households has no facility and uses open defecation).*
- *Electricity: Nationally, 15% of households have electricity.*
- *Household possessions: Mobile phones are common; in 56% of households, someone owns one. One-quarter of households have radios.*
- *Hand washing: One-third of the population lives in households with a place to wash hands that has both soap and water.*
- *Household population and composition: More than 4 in 10 people in Papua New Guinea are under age 15 (42%), while only 3% are age 65 and older.*
- *Children’s living arrangements: 6% of children under age 18 have lost at least one of their biological parents. Fourteen percent of children do not live with either of their biological parents.*
- *Education: Almost one-third of women and one-quarter of men age 6 and older have never attended school.” (“Papua New Guinea Demographic and Health Survey 2016-18”)*

Contextual Analysis and Stakeholder Consultation (continued)

PNG Kenembo School 2 Classrooms + Office

Education Buildings

The following extracts support programs that increase education infrastructure in the PNG Highland and Morobe Province.

"... Education: Almost one-third of women and one-quarter of men age 6 and older have never attended school."

"Papua New Guinea Demographic and Health Survey 2016-18"

A lack of access to quality education services in Papua New Guinea (PNG) is having a generational impact, particularly for girls, and condemns children to a life of continued poverty. The Better Governance for Education (BG4E) project will improve access to education for people living in the remote Obura Wonenara District, PNG. This is a whole-of-community project, supporting school children and adult students, working in every layer of education, from students to teachers, local facilitators, school boards and local education ministers. Fast Facts

- BG4E will directly benefit more than 11,000 students and support 240 teachers
- 6,000 community members will directly benefit from the project through improved school facilities and improved education results
- CARE has seen a 10% increase in girls graduating school since the project began as well as an improvement in literacy and numeracy performance
- Major partner: This project has been made possible thanks to generous contributions and ongoing support from the Australian Government through the Australian NGO Cooperation Program (ANCP) working in partnership with the Government of Papua New Guinea
- Major location: Obura Wonenara District, Papua New Guinea"

<https://www.care.org.au/better-schools-in-png/>

Morobe Development Foundation, a non-profit organisation located in PNG, is looking to fund the construction of Kobo Primary School. The purpose of this project is to enable the children of Kobo and Wainsoduna Village to receive an education. The funding that was promised to the project has not come through, so we're trying to raise money to improve one of the least developed areas in the Morobe province and improve the quality of life for residents.

<https://www.globalgiving.org/projects/constructing-a-school-in-rural-papua-new-guinea/>

THE Government is focused on improving education in Papua New Guinea's rural communities, Education Minister Jimmy Uguro says. Uguro said the Government aimed to ensure disadvantaged communities had access to education services. "We have already tasked the Education Department to identify the communities that have been left out," he said. "We have to build schools there, train teachers from the local area and educate them," he said. Uguro reiterated the government tuition fee subsidy (GTFS) policy which followed the principle of making the education of the child a shared responsibility of the Government and parents. He said churches and local communities played a vital role in education. He said the previous government had taken that responsibility away from parents making them lazy and detached. "We want to undo and cut out the dependency syndrome that we have systematically allowed into our PNG culture," Uguro said. "The shift in the school financing policy by Marape

Government is deliberate to get parents and communities to plough the soil, work hard and contribute to reviving the economy rather than creating a handout culture." He said Papua New Guineans were naturally hard working, resilient and self-reliant. The GTFS policy will re-establish the missing link between the parents and schools while the Government will invest in raising the quality of education, building more schools and making school managers and boards more accountable.

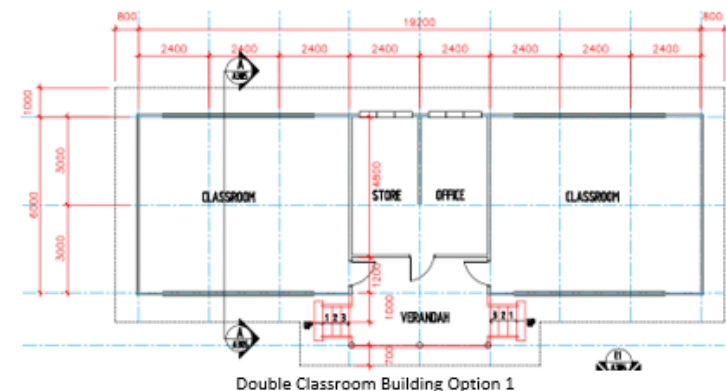
<https://www.thenational.com.pg/govt-focuses-on-education-in-rural-areas/>

The PNG Department of Education has produced a major report outlining the strategy to improve education outcomes, including the construction of school infrastructure. The following standard drawings are referenced in the report, but it appears that (at this in time) are not accessible either directly or via the TISER website.

- [Drawing Set Index](#)
- [Single Classroom on Posts](#)
- [Single Classroom on the Ground](#)
- [Double Classroom](#)
- [Double Classroom Building Option 1](#)
- [Double Classroom Building Option 2](#)
- [Double Classroom Building Option 3](#)
- [Double Classroom Building Option 4](#)
- [Double Classroom Building Option 5](#)
- [Classroom and Library Building](#)
- [Staffroom and Library Building Option 1](#)
- [Staffroom and Library Building Option 2](#)
- [Staffroom and Library Building Option 3](#)
- [Proposed Teachers House](#)
- [Proposed Teachers House Option b](#)
- [Proposed Teachers House Option c](#)
- [Duplex Teachers House](#)

<http://www.education.gov.pg/TISER/schools.html>

Following is just floor one plan from the report, to demonstrate a typical form of construction. The standards **DANCER** classrooms (as requested by the local district) exceed this requirement.



Contextual Analysis and Stakeholder Consultation (continued)

PNG Kenembo School 2 Classrooms + Office

The following extracts from "A National Plan for Education, 2005 – 2014", Papua New Guinea Department of Education, identify the timeline for defining the demand for Elementary, Primary and Secondary school buildings.

Other educational planning information is contained in the same report.

<http://www.education.gov.pg/TISER/documents/plans/national-plans/national-education-plan-2005-2014.pdf>

IMPLEMENTING THE PLAN

This section provides a timeline for the implementation of the Plan. Specific strategies and activities for each minor outcome in the Plan are listed, along with an indicative schedule for their implementation and completion. Detailed implementation plans will be provided each year through the annual plans of the Department of Education, provinces and districts.

Key:
 indicates full implementation
 indicates preparatory activities and reviews

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Elementary education										
Minor Outcome E1										
Establish and maintain a sufficient number of schools.										
Complete provincial and district plans for the implementation of elementary education.										
Determine quotas for the number of schools to be established annually in each province and district.										
Develop guidelines for communities and local-level governments to use for the establishment of elementary schools.										
Develop guidelines, to include building dimensions, for elementary school classrooms and other buildings.										
Develop an efficient process for the registration of schools and teachers.										
Primary education										
Minor Outcome P1										
Provide and maintain a sufficient number of schools.										
Completion and implementation of provincial and district plans for primary education.										
Completion of school plans to include both infrastructure and quality components.										
Determine quotas for the number of Grade 7 classes to be established annually in each province.										
Local-level governments to budget grants for infrastructure and maintenance.										
Review the structure of primary schools.										
Develop guidelines, to include building dimensions, for primary school classrooms and other buildings.										
Secondary education										
Minor Outcome S1										
Establish and maintain a sufficient number of schools.										
Complete provincial and district plans for the implementation of elementary education.										
Reclassify existing vocational institutions offering a lower secondary education as secondary schools.										
Maintain and rehabilitate all schools rather than construct new schools.										
Consider and implement the findings of the review of the national high schools.										

Internal Needs Assessment by PHA and VFH personnel

Demand for Community Health Buildings, Classrooms and Accommodation

All PHA-VFH programs are formulated in response to requests from the relevant authorities. For example –

- Runimb school double classrooms and office were commissioned by the Dei District Administration. Due to tribal and political violence at Runimb, this project has been transferred to Kenembo Primary School, also in the Dei District. There have been additional requests for classrooms and staff housing from several school boards.
- Kalolo community health building was commissioned by the International Committee of Red Cross (ICRC).
- Umi and Kopeng community health buildings were commissioned by the Western Highlands Provincial Health Authority (WHPHA) and Dei District Administration.
- Mul Baiyer Lumusa five police houses at were commissioned by the Mul Baiyer District Administration.

Records of Email Exchanges in Needs Assessment

The needs are assessed based on ongoing discussion and email dialogue from –

- Kelly Kombra Peng (VFH)
- Julienne McKay (consultant to VFH)
- Ian Volke (PHA)
- Rod Johnston (PHA)
- Jane Holden (Western Highlands Provincial Health Authority)
- Justin Maka (Headmaster of Kenembo Primary School)
- Other District Administration officials and NGO personnel, who are contacted directly by Kelly Kombra Peng and Julienne McKay.

All PHA and VFH email exchanges are retained in the permanent records of the relevant organisation.

Limitations

Most of the VFH work is around PNG Western Highlands Province, with some work further west.

These are areas of potential civil unrest and tribal violence, considerations of which dictate particular precautions and preference for prefabrication within the safety of the Mt Hagen workshop.

Contextual Analysis and Stakeholder Consultation (continued)

PNG Kenembo School 2 Classrooms + Office

Situation at 31 August 2023

This map and text are produced by Smartraveller.

<https://www.smartraveller.gov.au/destinations/pacific/papua-new-guinea#images>



Civil unrest and political tension

Tension between tribal, communal or clan groups can increase without warning. There's an increased risk during election periods. There have been instances of unlawfulness during elections and in response to arrest and detention sometimes resulting in deaths. Fighting often involves guns. Rioting and looting can follow. Outbreaks of violence have happened in squatter settlements, marketplaces and urban centres, and during elections including:

- *Port Moresby*
- *Lae*
- *Wabag*
- *Madang*
- *Mt Hagen (Western Highlands)*
- *Mendi*
- *Porgera*
- *Goroka*
- *Tari*
- *Daru*

If a clash happens, it may cause:

- *destruction of property*
- *serious injury*
- *disruption to services, including ground and air transport*
- *an increase in opportunistic crime*

Violent inter-group clashes and random killings of locals occurred in Enga Province, fuelled by the National Election. Violent tribal clashes resulted in property damage, sexual assault and murder.

Mendi and Nipa in the Southern Highlands Province had outbreaks of election unrest in July 2022. Similar incidents have occurred in Hela Province since 2018, including in 2022.

There's ongoing violence because of illegal mining at the Porgera gold mine. People have been killed and injured.

Stakeholder Analysis

Identify Stakeholders

Depending on the program, the stakeholders may vary.

For example, the stakeholders for village infrastructure construction projects could include the beneficiaries (school communities, health services, village residents etc.), the implementing NGO, the funding organisations, government and other interested parties such as additional donors.

For each stakeholder, the following questions should be considered.

- **Problems:** What are the key problems likely to be experienced by each stakeholder.
- **Interests:** What is the motivation of each stakeholder?
- **Potential:** How can each stakeholder contribute positively to the project at a high level?
- **Interaction:** How well this stakeholder relate to the other stakeholders in this project?
- **Others' actions:** Are other organizations involved in this project, either directly or indirectly?

Stakeholder Analysis

PNG Kenembo School 2 Classrooms + Office

	Beneficiary	Principal INGO	Implementing Partner	Government	Other Donors
	Kenembo Primary School Board	PHA	VFH	PNG Government	Nil
Problems	Communication with Kenembo by VFH is by vehicle over difficult roads, and is therefore infrequent.	Communication with VFH is via email, and is reasonably frequent.	Communication with Kenembo is by phone and vehicle over difficult roads	Government does not have adequate funding.	NA
Interests	Wants a reliable Kenembo School - Two Classrooms (80 to 100) & Office.	Wants reliable structural performance of new school buildings meeting village needs.	Wants new school buildings meeting village needs as defined by the beneficiary.	Building performance regulations.	NA
Potential	Can assist construction (sweat equity) and limited funding if required.	PHA offers funding and probono design & management skills.	VFH has supervision & liaison skills.	NA	NA
Interaction	VFH Program Manager will discuss involvement.	PHA coordinates funding, design, & management.	VFH manages construction.	NA	NA
Others	NA	NA	NA	NA	NA

SWOT Analysis

SWOT Analysis can assist participatory group discussions to focus on the important project issues such as organizational and community capacity and societal factors.

Strengths

List the reasons why your organisation is particularly suited to carrying out this project. This might include your unique skills (building skills, administrative skills etc.), availability of other professional assistance. Enhanced experience and a comprehensive track record are considered strengths.

Weaknesses

List the factors that could delay or disrupt the execution of the project. How could these weaknesses be improved?

Opportunities

List the reasons for undertaking the project. This might include the provision of education, improved health, better housing, safer water supplies, better communications and the like.

Threats

List what situations could prevent the timely, cost-efficient and effective delivery of the program. These could include lack of funding, tribal violence, changes in legislative requirements etc.

SWOT Analysis

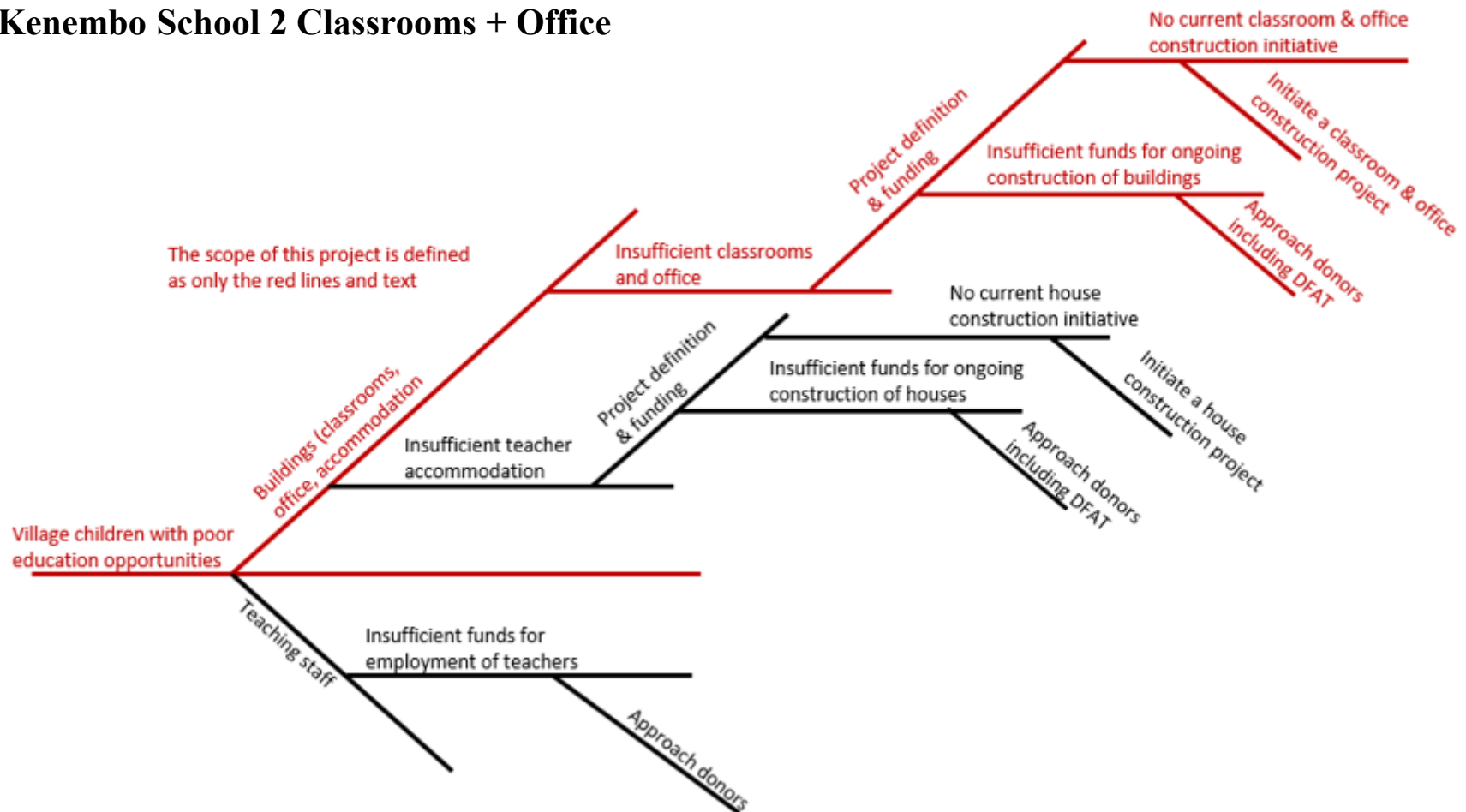
PNG Kenembo School 2 Classrooms + Office

STRENGTHS	WEAKNESSES
<p>PHA has good design & construction skills. PHA & VFH have good local track record. VFH has good rapport with the village.</p>	<p>Lack on-going donor funding commitments will not affect this project, but would effectively cause a discontinuation of the overall future program. Communications with remote village are difficult.</p>
OPPORTUNITIES	THREATS
<p>Project will provide improved education opportunities in structurally reliable classrooms and office. This will greatly improve long-term education outcomes. This project can be an example of positive education outcomes resulting from close cooperation.</p>	<p>Local tribal violence could delay the project. Potential donor agency requirements significantly increase administrative costs, thus reducing the number of such projects that can be undertaken.</p>

Fishbone Diagram Analysis

Fishbone Diagram analyses provide a logical way, during brainstorming sessions, of thinking through the main issues affecting the implementation of a project. The main problem to be solved is listed on the “backbone” and the contributing factors are progressively listed on the sloping “bones” and then (in turn) on the horizontal “bones”.

PNG Kenembo School 2 Classrooms + Office

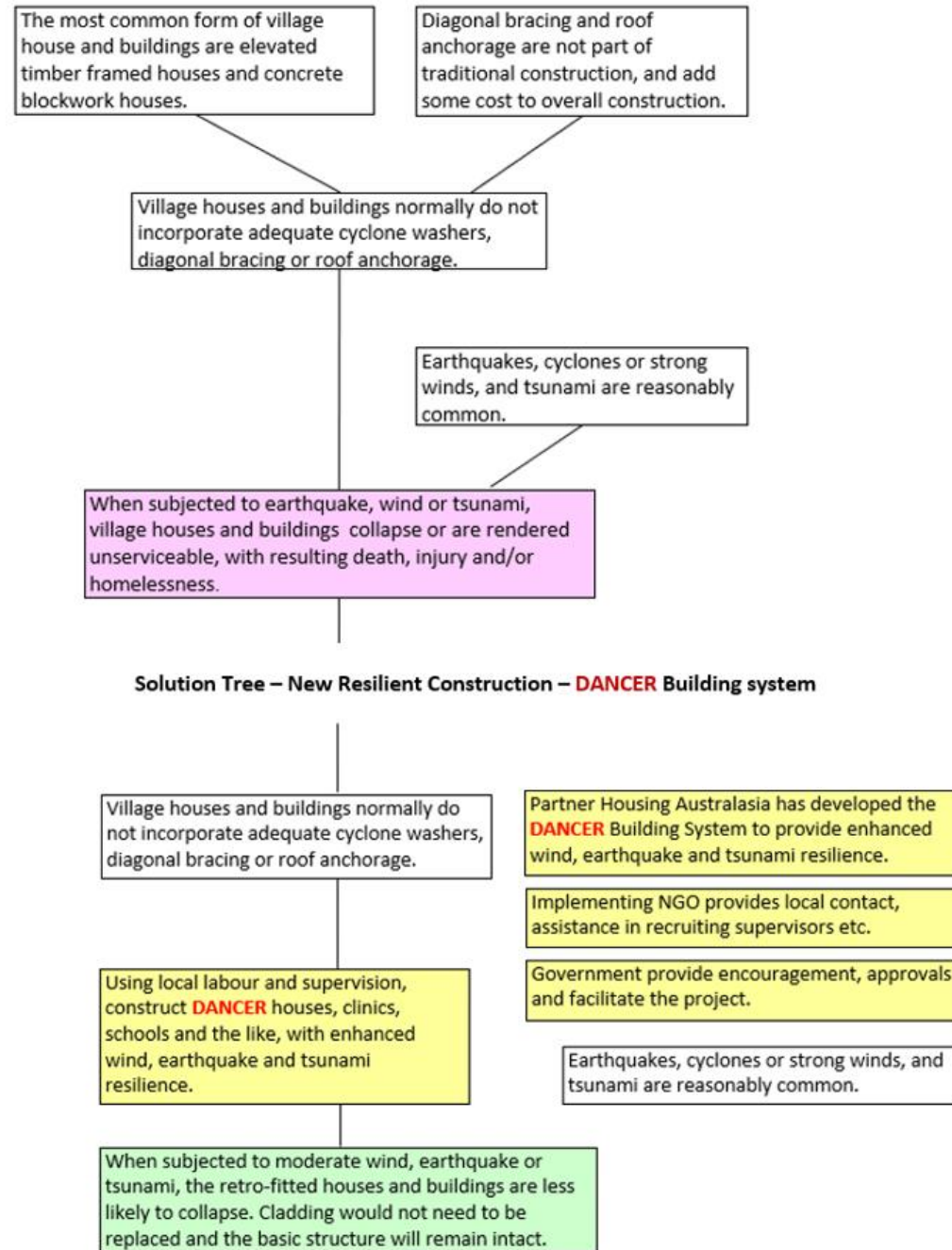


Problem Tree Analysis

PNG Kenembo School 2 Classrooms + Office

This “Problem Tree and Solution Tree” analysis relates to the structural resilience of houses and public buildings in rural PNG villages.

Other analyses may be appropriate for educational and/or health applications.



References

PNG – References for projects to construct community health buildings and educational buildings

References

Thomason, J.A., “*Quality of health services in Papua New Guinea: what do we know?*”, June 1993, National Library of Medicine, <https://pubmed.ncbi.nlm.nih.gov/8154201/>

“*Health security in Papua New Guinea*”, Australian Government Department of Foreign Affairs and Trade, 2022 <https://www.dfat.gov.au/geo/papua-new-guinea/development-assistance/health-security-in-png>

“*Health Infrastructure*”, Digicel Foundation PNG, 2022, <https://www.digicelfoundation.org/png/en/home/programmes/health/basic-health.html>

“*PNG: Rural Primary Health Services Delivery Project*”, February 2022, Asian Development Bank, Project Administration Manual (Including Additional Financing), Project Number: 41509-013 Loan Number: 2785, 8274 Grant Number: 0259 <https://www.adb.org/projects/41509-013/main>

“*Papua New Guinea Demographic and Health Survey 2016-18*”, Government of Papua New Guinea, National Statistical Office, www.nso.gov.pg/census-surveys/demographic-and-health-survey/

CARE Australia website, <https://www.care.org.au/better-schools-in-png/>

“*Constructing a school in rural Papua New Guinea*”, Morobe Development Foundation Inc website, <https://www.globalgiving.org/projects/constructing-a-school-in-rural-papua-new-guinea/>

“*Govt focuses on education in rural areas*”, 19 January 2021, The National website, <https://www.thenational.com.pg/govt-focuses-on-education-in-rural-areas/>

“*TisR*”, Papua New Guinea, Department of Education website, <http://www.education.gov.pg/TISER/schools.html>

“*Structural Design Actions for South Pacific Village Buildings*”, 7 September 2022, Partner Housing Australasia & Quasar Management Services, Ref: Q21110102-1b

“*DANCER Building System, Direct Anchorage Noncyclonic / Cyclonic Earthquake Resistant Building System for Wind, Earthquake and Tsunami Resistance*”, 7 September 2022, Partner Housing Australasia & Quasar Management Services, Ref: Q21110101-1b DANCER Design Manual.

“*Assessment of Damage and Recommended Repairs Resulting from February 2018 PNG Earthquake and Aftershocks for the Catholic Diocese of Mendi*”, 13 May 2018, Q18051001-1

“*Structural Resilience of the Standard Cyclone Resistant House for Ha’apai, Tonga following Cyclone Ian, January 2014*” 18 February 2014, P14021601-1

“*Habitat for Humanity Australia, Solomon Islands Gizo Island, Tsunami Reconstruction 2007*”, 19 June 2007, D07061201-1

“*Design and Construction Assessment, Tsunami Reconstruction Housing, Thailand, Indonesia, Sri Lanka & India, For Habitat for Humanity International (Asia – Pacific)*”, 13 January, 2006, P05090201-3

Log Frame Analysis of Objectives, Outputs, Outcomes and Activities

Objectives (What we want to achieve)	Indicators (How to measure change)	Means of verification (Where/how to get information)	Assumptions (What else to be aware of)
Goal The long-term results that an intervention seeks to achieve, which may be contributed to by factors outside the intervention	Impact indicators Quantitative and/or qualitative criteria to measure progress against the goal	How the information on the indicator(s) will be collected (can include who will collect it and how often)	External factors beyond the control of the intervention, necessary for the goal to contribute to higher-level results
Outcome(s) The primary result(s) that an intervention seeks to achieve, most commonly in terms of the knowledge, attitudes or practices of the target group	Outcome indicators Quantitative and/or qualitative criteria to measure progress against the outcomes	As above	External factors beyond the control of the intervention, necessary for the outcomes to contribute to achieving the goal.
Outputs The tangible products, goods and services and other immediate results that lead to the achievement of outcomes	Output indicators Quantitative and/or qualitative criteria to measure progress against the outputs	As above	External factors beyond the control of the intervention, necessary if outputs are to lead to the achievement of the outcomes
Activities The collection of tasks to be carried out in order to achieve the outputs	Inputs The materials and resources needed to implement activities	Costs (and sources) The summary costs for each of the identified resources/ activities; sources of income can also be specified	External factors beyond the control of the intervention, necessary for the activities to achieve the outputs

Preparing a Log Frame

As the name implies, a **Log Frame should be based on logic** to determine the program or project objectives, assumptions, indicators, the monitoring, and the activities to be undertaken.

Idealism suggest a logical approach when preparing a Log Frame matrix is to progress from Goals to Objectives to Outcomes to Actions.

However, **pragmatism** will be achieved by working in the opposite direction, Actions to Outcomes to Objectives to Goals. This ensures that timeframes can be achieved and budget limitations can be accommodated.

The sensible way is to commence with an idealism approach, and use pragmatism to check and modify it considering the **resources** available and the practicality of specified **indicators** and **monitoring**.

There is no point in specifying indicators or a monitoring regime that cannot (in practice) be implemented, or the results verified. The use of **digital cameras and emails** to facilitate good communications between site supervisors and project managers or designers can greatly assist practical monitoring.

Goal			
Partner Housing Australasia ... aims to transform the lives of people living in Asia-Pacific villages by improving the cyclone, earthquake and tsunami resistance of their houses, clinics, schools and community buildings ...	The goal will be achieved through the fulfilment of the outcomes, outputs and activities below.	Monitor the indicators below.	The risk is that funding bodies fail to understand the need for improved infrastructure resilience.
Outcomes			
Lives improved during the design life, as a result of each year of construction Increased building resilience provided at minimum cost to the beneficiaries	Completion of an educational building with features for women & children and disability and quantified environmental protection.	Multiply the number of people in the classrooms (100) by the design life (30 years) divide by cost (AUD).	These estimates are based on target of at least 0.030 people pa. years/\$. Tribal violence in Runimb, caused a change to Kenembo and delayed start.
Outputs			
One new building (community health building or educational building or equivalent housing built each year), with enhanced resistance to cyclones, earthquakes and/or tsunami.	Project expenditure, \$. % complete of the project.	Total project expenditure, from the annual accounts progress report from VFH.	Target is contingent on funding. Pre-existing Tribal violence in Runimb, caused a change to Kenembo and
Activities			
Prepare a Needs Analysis	% complete	Report % complete	Must rely on national statistics.
Project definition	% complete	Report % complete	Requires local agreement
Stakeholder consultation and site meeting	% complete	Report % complete	Funding for a site visit
Pre-construction child protection meeting	% complete	Report % complete	Funding for a site visit required
Contract or MOU with Partner Organisation	% complete	Report % complete	Only required if funded externally
Design and prepare design file	% complete	Report % complete	Normal design process.
Prepare Bill of Quantities (BOQ)	% complete	Report % complete	Normal BOQ process.
Obtain quotations for materials	% complete	Report % complete	Quote or standards prices may be used
Order materials	% complete	Report % complete	Must be locally available.
Take delivery of materials	% complete	Report % complete	Will depend on

Then

If

And

Log Frame Analysis of Objectives, Outputs, Outcomes and Activities

PNG Kenembo School 2 Classrooms + Office

Partner Housing Australasia, Vision for Homes, Quasar Management Services – Project Plan – Kenembo School Building			Date: 29 March 2022 ¹
Targets	Objectively Verifiable Indicators, OVIs	Means Of Verification, MOVs	Risks & Assumptions
Goal			
<i>Partner Housing Australasia ... aims to transform the lives of people living in Asia-Pacific villages by improving the cyclone, earthquake and tsunami resistance of their houses, clinics, schools and community buildings ...</i>	The goal will be achieved through the fulfilment of the outcomes, outputs and activities below.	Monitor the indicators below.	The risk is that funding bodies fail to understand the need for improved infrastructure resilience.
Outcomes			
Lives improved during the design life, as a result of each year of construction Increased building resilience provided at minimum cost to the beneficiaries	Completion of an educational building with features for women & children and disabled and quantified environmental protection.	Multiply the number of people in the classrooms (100) by the design life (30 years) divide by cost (AUD).	These estimates are based on target of at least 0.030 people pa. years/\$. Tribal violence in Runimb, caused a change to Kenembo and delayed start.
Outputs			
One new building (community health building <u>or</u> educational building <u>or</u> equivalent housing built each year), with enhanced resistance to cyclones, earthquakes and/or tsunami.	Project expenditure, \$, % complete of the projects.	Total project expenditure, from the annual accounts. Progress report from VFH.	Target is contingent on funding. Pre-existing Tribal violence in Runimb, caused a change to Kenembo and delayed start.
Features that protect women and children as specified in the design file included in built infrastructure.	Lockable toilet doors designed for the current project	Check design file for lockable doors.	Obtain community support, before committing funds.
Features that provide for people with disabilities as specified in the design file included in built infrastructure.	School authority did not require access ramps and are not practical. These will be retrofitted if requested.	Consult design file for provision of a ramp (if required).	Obtain community support, before committing funds.
Features that provide environmental protection as specified in the design file included in built infrastructure.	Tree planting expenditure d for the Kenembo school, to be funded in 2023-2024.	Check accounts for expenditure.	Obtain community support, before committing funds.

Activities			
Prepare a Needs Analysis	% complete	Report % complete	Must rely on national statistics.
Project definition	% complete	Report % complete	Requires local agreement
Stakeholder consultation and site meeting	% complete	Report % complete	Funding for a separate site visit.
Pre-construction child protection meeting	% complete	Report % complete	Funding for a site visit required
Contract or MOU with Partner Organisation	% complete	Report % complete	Only required if funded externally
Design and prepare design file	% complete	Report % complete	Normal design process.
Prepare Bill of Quantities (BOQ)	% complete	Report % complete	Normal BOQ process.
Obtain quotations for materials	% complete	Report % complete	Quote or standards prices may be used
Order materials	% complete	Report % complete	Must be locally available.
Take delivery of materials	% complete	Report % complete	Will depend on transport method
Prefabrication	% complete	Report % complete	
Transport to site	% complete	Report % complete	Delivery from Honiara or Gizo
Site construction	% complete	Report % complete	VFH supervisor and local labour
Post-construction child protection meeting	% complete	Report when complete	Requires a separate site visit.
Hand-over	% complete	Report when complete	All infrastructure working

Points to Ponder

1. This training module has mentioned several analysis tools – Stakeholder Analysis, SWOT Analysis, Fishbone Diagram Analysis and Problem Tree Analysis. However, there are many more analysis tools (such as Critical Path Networking and PERT) available to program and project designers.

Which tools are most useful in understanding the issues of a particular program or project?

2. Funding organisations often have expectations that certain analysis tools will be employed, but often such expectations lead to the selection and use of tools that are not useful and (in some cases) misleading.

Are funding organisation expectations for the used of certain analysis tools counterproductive?

3. It is common to assume that analysis tools are only useful at the planning stage of a program or project. However, if properly used, the same analysis tools can be progressively updated and used for implementation monitoring. In particular, the Log Frame tool may be adapted to serve this purpose.

Can the analysis tools be adapted for program or project monitoring and control?

4. A “project” is a discreet undertaking (e.g. construction of a school building), which, together with other “projects”, comprise a “program” (e.g. Improvement of educational infrastructure).

Does the organisation correctly differentiate between programs and the constituent projects?

Engineering Design and Construction

The following suite of detailed Quasar Management Services training packages and manuals are available from the website. They set out principles and practices appropriate for the engineering design and construction of South Pacific village infrastructure.

Manuals

- HELPER Manual
- Human Rights in South Pacific Villages
- DANCER Building System Design Manual
- VILLAGE AQUA WASH Manual
- Structural Design Actions for South Pacific Village Buildings

Training Packages

- Humanitarian Engineering
- Building Skills
- Rural Water Supply
- Rural Sanitation

Humanitarian Engineering Tutorial Assignment

Kudu Water Supply



Kudu Water Supply Assignment

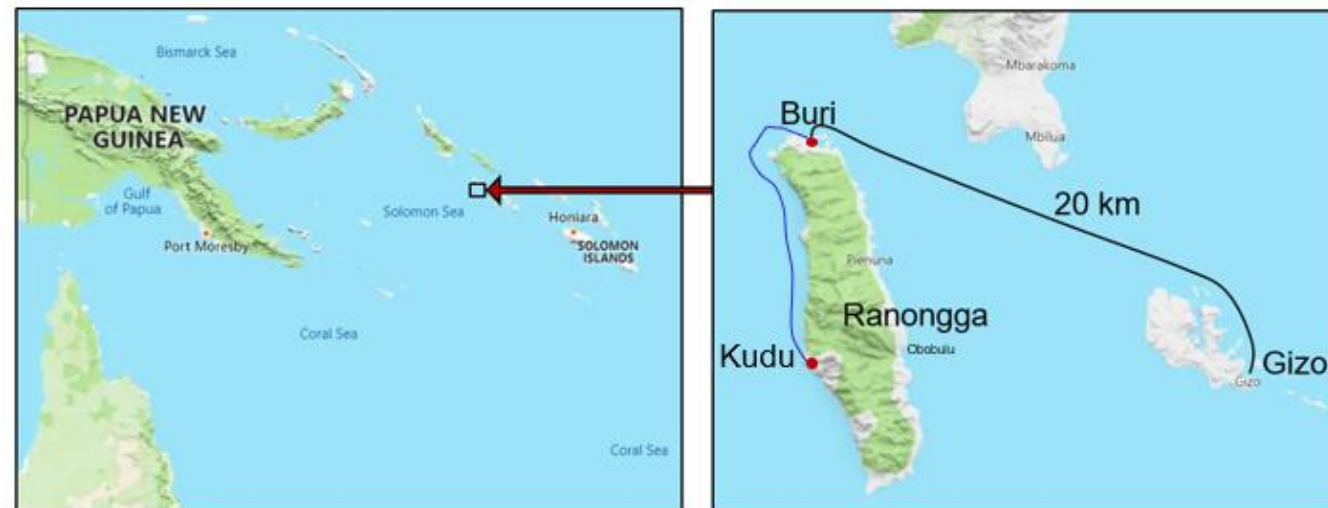
Introduction

This brief provides an introduction to the scope of work required to complete this assignment. Uniquely, this is a **real project** implemented by Partner Housing Australasia, an NGO (non-governmental organisation), being funded by the generous donations by Australians.

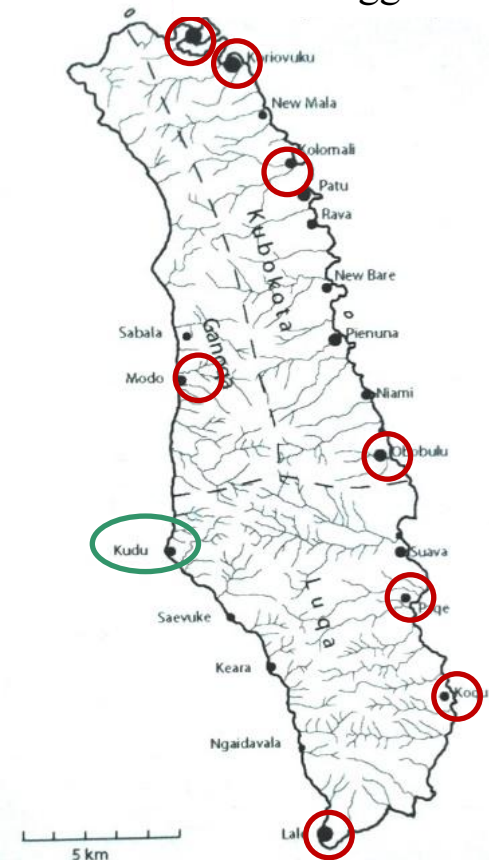
Kudu village is located on the remote island of Ranongga in the Solomon Islands Western Province.

You will design a new gravity feed water supply system for the community of Kudu, located on the remote west coast of Ranongga (50 km west of Gizo), in the Solomon Islands.

Your project design should be compatible with the principal requirements of major donors, and will be in Log Frame format. Your project design should identify the major governance issues and suggest appropriate approaches.



Previous Projects on Ranongga Island



Partner Housing Australasia

Partner Housing Australasia is an entirely voluntary organisation, which aims to transform the lives of people living in Asia-Pacific villages by improving the cyclone, earthquake and tsunami resistance of their houses, clinics, schools, and community buildings; and by providing clean water supplies and hygienic sanitation.

Partner Housing Australasia offers four basic services:

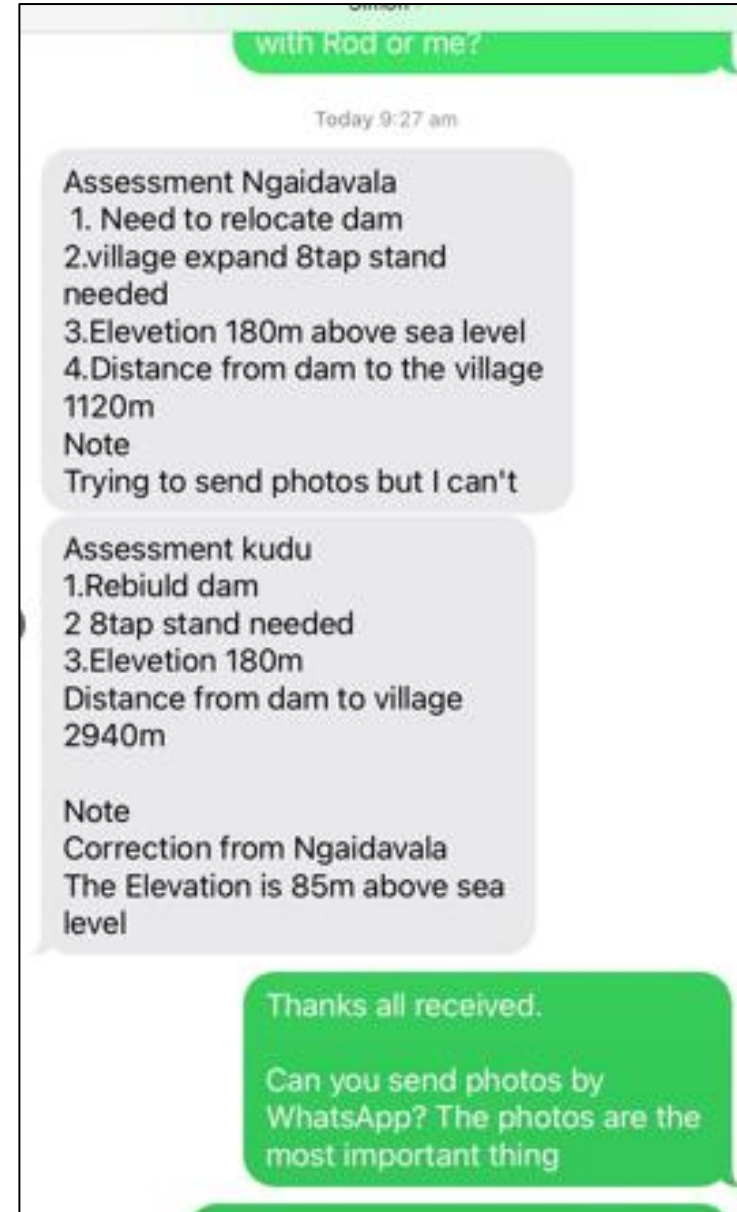
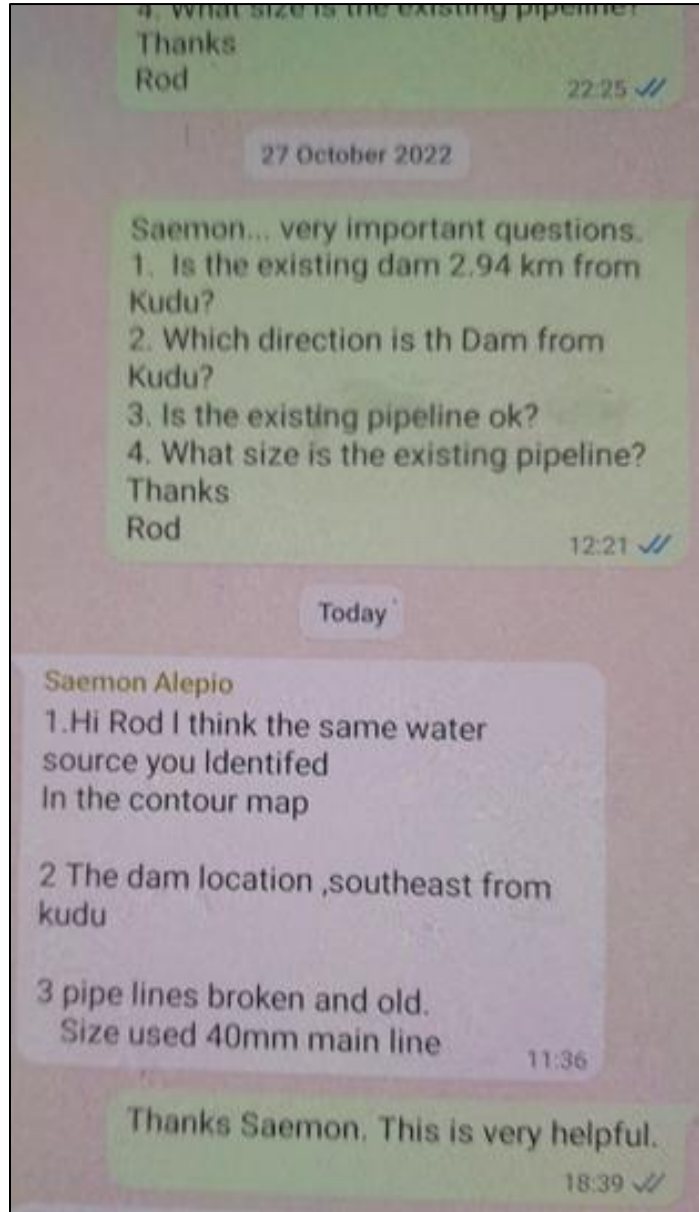
1. Pro-bono “Design and Help-Desk” Engineering Services to other Non-governmental Organisations (NGOs) and governments of South Pacific countries.
2. Finance, design, materials supply, supervision, mentoring and training for village infrastructure, clinics schools, water, sanitation, and housing projects.
3. Development of village building systems with enhanced cyclone, earthquake and tsunami resistance and sustainable rural water supply and sanitation systems.
4. Training programs for the design, construction and maintenance of improved village buildings, rural water supply, and sanitation.



Travel is challenging



Communications are challenging



The terrain is challenging



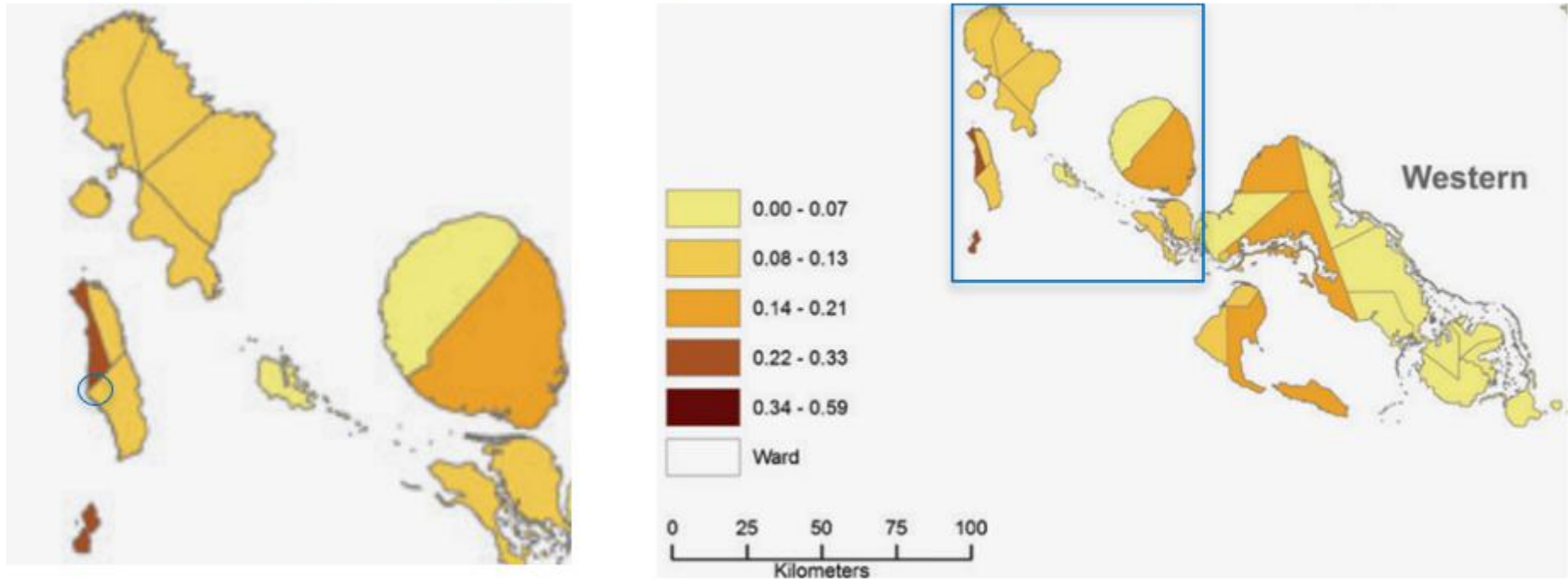
Maintenance is challenging



Solomon Islands Poverty

While there are not especially large numbers of poor people living in the west of the Solomon Islands, there are still some wards where the share of the population living in poverty is relatively high.

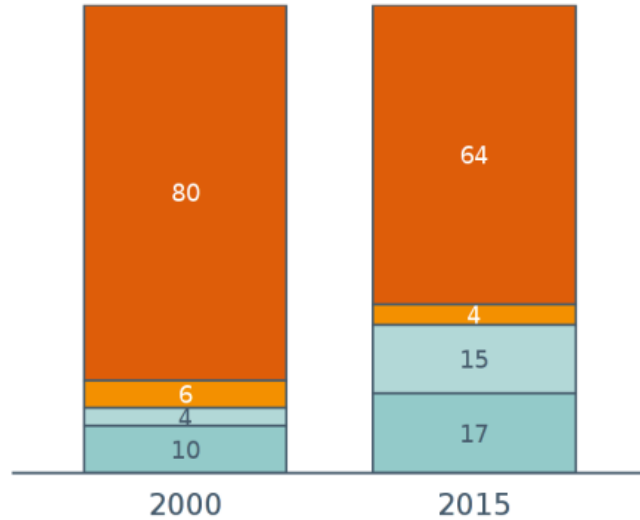
Poverty headcount rate by ward: Share of population living below the basic needs poverty line



Solomon Islands Poverty

Drinking water coverage (% population)

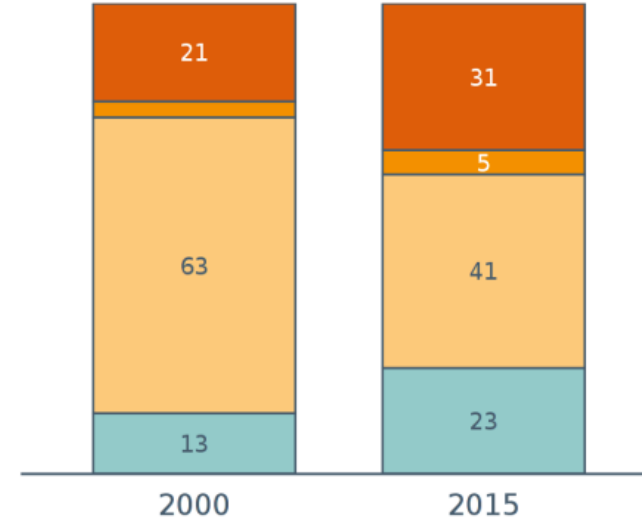
● Basic
 ● Limited
 ● Safely managed
● Surface water
 ● Unimproved



Source: WHO/UNICEF Joint Monitoring Programme 2017.

Sanitation coverage (% population)

● Basic
 ● Limited
 ● Open defecation
● Safely managed
 ● Unimproved



Source: WHO/UNICEF Joint Monitoring Programme 2017.

https://globalnutritionreport.org/documents/262/Solomon_Islands.pdf

Solomon Islands Poverty

The best access to rural water supplies in Solomon Islands Western Province (83% to 100%, dark green shading) is in the Shortland Islands and in North Ranongga.

Central Ranongga and South Ranongga have significantly better access (49% to 66%, indicated by pale green shading) than most other parts of the Western Province.



Solomon Islands – Kudu Water Supply

Log Frame Analysis of Objectives, Outputs, Outcomes and Activities

Partner Housing Australasia – Project Plan – Kudu Village Water Supply			Date: 30 June 2023
Targets	Objectively Verifiable Indicators, OVIs	Means Of Verification, MOVs	Risks & Assumptions
Goal			
<i>Partner Housing Australasia ... aims to transform the lives of people living in Asia-Pacific villages ... by providing clean water supplies and hygienic sanitation.</i>	Consolidation of the evaluations reported below.	Monitor the indicators below.	The risk is that funding bodies fail to understand the need for improved infrastructure resilience.
Outcomes			
Reliable water supply provided at minimum cost to the beneficiaries in Kudu Village	Consolidation of the evaluations reported below.	Monitor the indicators below.	There exists risk of construction not complying with the design if not properly managed.
Outputs			
One new reliable village water supply scheme	% complete of the projects.	Progress report from Partner Organisation	Pre-existing UNICEF commitments delayed start.
Features that protect women and children as specified in the design file included in built infrastructure.	Description of the protection for women & children incorporated in the projects.	Check design file for screens & lockable doors.	Obtain community support, before committing funds.
Features that provide for people with disabilities as specified in the design file included in built infrastructure.	Description of disability features incorporated in the projects.	Consult design file for ramps.	Obtain community support, before committing funds.
Features that provide environmental protection as specified in the design file included in built infrastructure.	Description of environment protection in the projects.	Check accounts for expenditure.	Obtain community support, before committing funds.

Activities			
Prepare a Needs Analysis	% complete	Report % complete	Must rely on national statistics.
Project definition	% complete	Report % complete	
Stakeholder consultation and site meeting	% complete	Report % complete	Funding for a separate site visit.
Pre-construction child protection meeting	% complete	Report % complete	Funding for a site visit required
Contract or MOU with Beneficiary stakeholders	% complete	Report % complete	MOU is suitable
Contract or MOU with Partner Organisation	% complete	Report % complete	Only required if funded externally
Design and prepare design file	% complete	Report % complete	Normal design process.
Prepare Bill of Quantities (BOQ)	% complete	Report % complete	Normal BOQ process.
Obtain quotations for materials	% complete	Report % complete	Quote or standards prices may be used
Order materials	% complete	Report % complete	May be local or Honiara supply
Take delivery of materials	% complete	Report % complete	Will depend on transport method
Fabrication (including trial erection where appropriate)	% complete	Report % complete	May be done on site or at base
Transport to site	% complete	Report % complete	Delivery from Honiara or Gizo
Site construction	% complete	Report % complete	SRCA supervisor and local labour
Commissioning	% complete	Report when complete	Testing of all standpipes
Post-construction child protection meeting	% complete	Report when complete	Requires a separate site visit.
Hand-over	% complete	Report when complete	
Routine maintenance	% complete	Report when initiated	

Kudu Water Supply – Engineering Design Standards and Input

Your designs should adhere to the Solomon Islands RWASH Design and Construction Standards (which are linked at the end of this brief). There is strong leadership in this community and community participation in the construction phase is expected to be relatively strong – reasonable expectations for these contributions should be detailed.

As with all projects of this type in remote locations, prior knowledge of the size of the population and the location of water sources is extremely difficult to obtain. The design brief is intended to reflect these difficulties, and you will be expected to develop skills in collecting and analyzing information from various sources, for purposes of design.

For example-

- The design life could be determined giving consideration to the expected growth in population and maintenance issues.
- The current population could be determined by counting the number of houses in the aerial photograph, and multiplying by an average number of people likely to be living in each house.
- The future design population could be determined by increasing the population by an assumed growth over the design life.
- Seasonal rainfall data, catchment areas (determined from contours), and assumed runoff percentage could be used to determine the seasonal water flows in catchments feeding alternate water sources.
- Possible locations for small dams (to serve as water sources) can be determined considering the required hydraulic head, the heights indicated by the contours, and the flows available from various catchments.

Kudu Water Supply – Design Input (continued)

The design should consider, and select one of the two following options for the design and construction of a water supply system to cater for the future population of the village at the design life. You could draw water

- a) from a nearby (but limited) source approximately 1.0 km walking distance to the south-east of the village, or
- b) from a more reliable source within 5.0 km walking distance of the village.

Geographic coordinates: 8°5'25"S 156°32'00"E

The system should propose and detail the layout for a gravity-fed water system. This may require the need for storage tanks in order to meet peak daily demands in water usage. You will need to consider the placement of proposed standpipes in the community, detailing the proposed locations. Additional details on locations desired by the community will be provided upon request..

There are approximately 40 houses with a maximum average of 5 people per house, indicating a maximum village population of 200 people living in Kudu at present.

Design should be based on the predicted maximum population at the end of an assumed design life.



Kudu Village



57 people (recorded on an attendance list) attended this pre-construction village meeting and posed for this photograph, on the understanding that their photo would be published and used for training purposes. Notwithstanding this permission, their faces (except for the SRCA supervisor) are obscured for enhanced privacy. Approximately one third are children.

Population check. If a third of the village were present at the meeting, this would indicate a village population of approximately 180. Therefore, an estimate of 200 is probably conservative, but still can be used for water supply purposes.

Kudu Water Supply

Budget and Bill Of Quantities

You should provide a bill of quantities and estimated cost to construction for the proposed water system (excluding their program and project management costs). This needs to cover any hired labour, tools, and all materials, including spare parts and a maintenance kit. Larger upfront capital costs should be considered (within the allowable budget) to reduce maintenance and extend the service life of the system. For example, this may involve selecting parts which have a longer service life or can be more reliably procured. You may want to consider buying a lower quality part that with guarantee of supply.

Maintenance Plan

While construction of the system is relatively simple, the most difficult challenge will be sustained maintenance. As such, there should be a comprehensive plan to ensure that the system remain operational for years to come. This should consider any required training programs to ensure sufficient local skills, tools, spare parts, and consideration of local supply chains which are unreliable.

Local Governance

There should also be consideration for local governance structures to manage the system and possible payment structure to source funds for ongoing maintenance costs. The entire system should be designed with these aspects in mind.

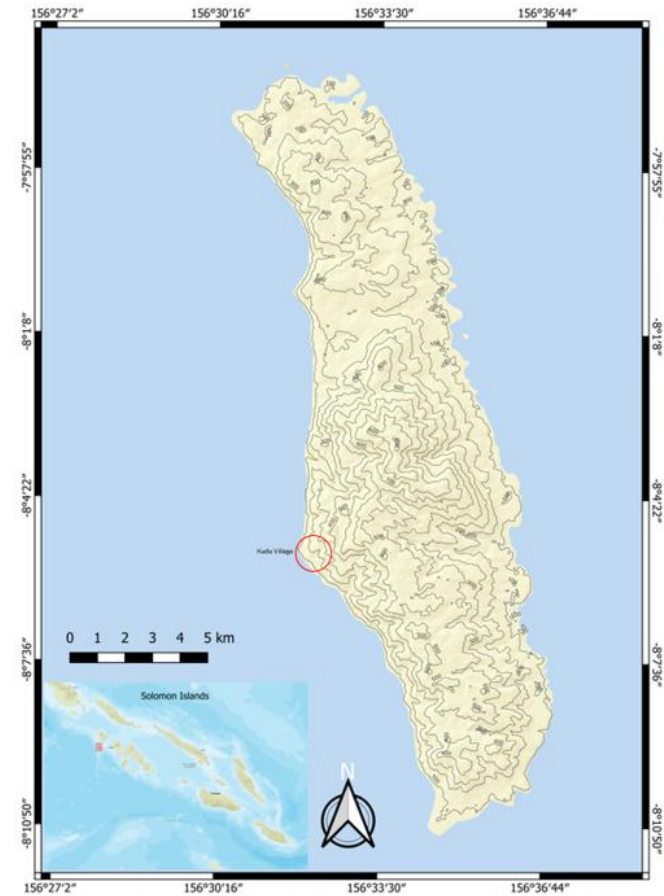
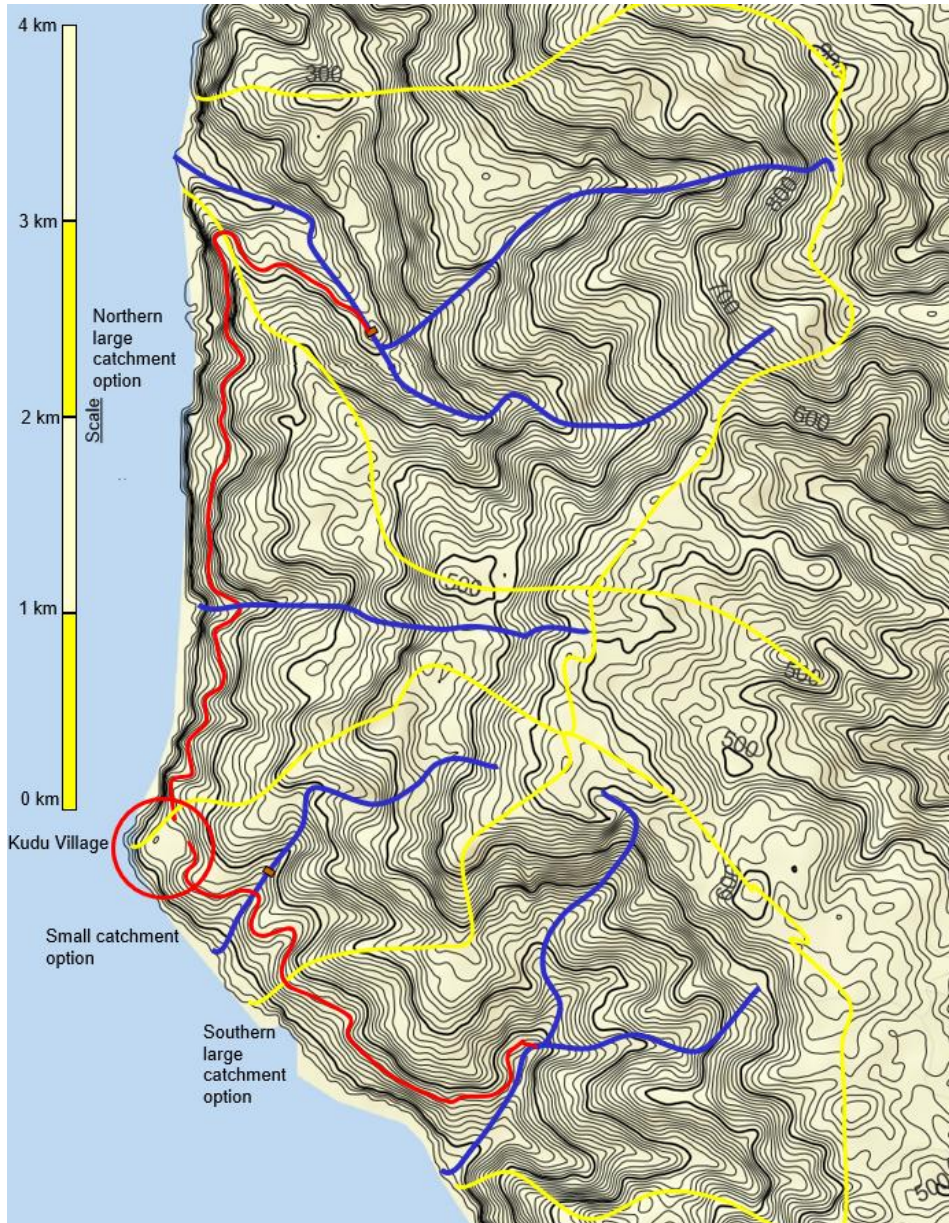
Construction Schedule

You should provide an estimated completion schedule for construction. It takes about 6 weeks to get the parts delivered if they come from Honiara (the capital of the Solomon Islands). It normally takes about 3-4 weeks to get the order sorted out, especially if things are out of stock and have to come from China or New Zealand. Wherever possible, you should preference the use of locally sourced materials.

Kudu Water Supply – Key References And Standards

- [Solomon Islands Rural Water, Sanitation, and Hygiene \(SI RWASH\) Engineering Standards](#)
- [Australia Solomon Islands Aid Partnership 2017-2020](#)
- [National Development Strategy 2016 – 2035](#)
- [Humanitarian Data Exchange – Solomon Islands](#)
- [GOVERNANCE | Partnerhousingaus](#)

Kudu Water Supply – Topography



Kudu Water Supply – Project Costs

An important part of the Kudu Water Supply Projects is to calculate reasonably accurate costs. This is done after you have done the design, although an unexpected high cost may suggest that you reexamine the design. Based on previous similar projects, it is expected that the total project cost will be **approximately AUD 40,000** (+ or - 25%) AUD = Australian dollars.

Materials

- a) Prepare a **Bill of Quantities (BOQ), a list of all of the materials** necessary to complete the project. Include components (pipes, fittings, cement etc), consumables (fuel etc) and tools. Make an allowance for wastage, breakage and spares. Once the materials are delivered to site, it is quite impractical to go back to Gizo for replacements.
- b) Determine the **unit price for each of the materials** in the BOQ. See a partial list below. You may be able to estimate other prices by extrapolation from the partial list. You may check these prices approximately by determining the costs in Australia (from Australian hardware outlets) and converting to SBD (Solomon Island dollars), and making an allowance for supply difficulties in Solomon Islands. You will need to determine an exchange rate from the internet.
- c) Calculate the material costs by **multiplying the quantities by the unit costs**. Calculate the total material costs.

Subcontract, Day-labour and Services

- a) Prepare a list of construction activities. This list probably from the “Activities” part of your Log Frame Analysis.
- b) Determine the **unit price for the subcontract supervisor and a specialist plumber**. This is difficult to estimate. Unless you have more accurate information, you could perhaps allow approximately 50% of the materials cost.
- c) You may assume that **day labour is provided by the village resident free**.

Design and Auditing

- a) You may assume that the **design is carried out pro bono (at no cost) by volunteer students** and engineers.
- b) You may assume that mandatory auditing is carried out by volunteers, but you should allow **airfares from Sydney to Gizo and return, and 4 days hotel accommodation and meals in Gizo**.

Contingency

- a) Allow a contingency for price changes, design delays, changes and other unforeseen circumstances. Between **20% and 30%** is reasonable.

Kudu Water Supply – Some Typical Material Costs

Hardware	Unit	Unit Price SBD
Cement 40 kg/bag	40 kg bags	\$ 113.00
F62 welded reinforced concrete mesh (5.8m x 2.2m x 6.00 mm dia,	sheet	\$ 710.00
10 mm steel rod x 1 900 x 400 mm, cut to length and bend to L	each	\$ 142.86
75 x 2.35 ϕ mm Bright jolt head nails	kg	\$ 30.00
1.25 mm galvanised tie wire x 50 m, Zenith	roll	\$ 55.00
150 x 25 mm rough sawn timber formwork x 3.4 m (approx)	lengths	\$ 100.00
DN 50 HDPE Pipes and Fittings	Unit	Unit Price SBD
DN50 blue line HDPE pipe, 150 m/coil PN12.5 AS/NZ 4130	150 m coil	\$ 6,250.00
DN50 poly coupling, Plasson	each	\$ 165.00
DN50 Poly M/thread adaptor, Plasson	each	\$ 115.00
DN 50 Galvanised Steel Pipes and Fittings	Unit	Unit Price SBD
DN50 x 90 degree galvanised elbow	each	\$ 50.00
DN50 x 3 mm galvanised pipe x 100 mm, thread both ends	each	\$ 380.00
DN50 gate valve brass, FF GVB50, Norma	each	\$ 396.00
DN50 galvanised hex nipple	each	\$ 36.00
DN50 x 300 mm PVC pressure pipe with drilled holes	each	\$ 40.00
DN50 galvanised pipe x 1.0 m, with both ends threaded	each	\$ 760.00
DN50 ball float valve, tank floater	each	\$ 288.00
DN 50 PVC Pipes and Fittings	Unit	Unit Price SBD
50mm female BSP faucet socket PVC pressure	each	\$ 30.00
DN50 x 88 degree DWV PVC plain bend	each	\$ 12.00
50mm PVC end cap	each	\$ 20.00
DN50 PVC Pipe (DWV) x 2.0 m	each	\$ 40.00
DN50 x DN32 poly reducing set, Plasson	each	\$ 55.00
DN50 PVC Pipe (DWV) x 900 mm, 1 piece (cut from stock length, SBD \$ 715 each 5.8 stock length)	900 (ex 5.8 m)	\$ 204.29
DN50 drop in grate poly round white	each	\$ 24.00
DN50 x 88 degree DWV PVC plain bend	each	\$ 56.00
DN50 DWV PVC pipe x 2.0 m (cut from 5.8 m length)	each	\$ 235.00

Kudu Water Supply – Some Typical Material Costs

DN 32 HDPE Pipes and Fittings	Unit	Unit Price SBD
DN32 blue line HDPE pipe x 200 m/coil, PN12.5, AS/NZ 4130	200 m coil	\$ 3,480.00
DN32 poly coupling, Plasson	each	\$ 80.00
DN32 x 90 degree poly tee, Plasson	each	\$ 140.00
DN32 x DN20 Poly metric thread aptor, Plasson	each	\$ 55.00
DN20 Galvanised Steel Pipes and Fittings	Unit	Unit Price SBD
DN20 galvanised elbow x 90 degree	each	\$ 12.00
DN20 x 2.5mm galvanised pipe x 1200 mm, threaded	each	\$ 430.00
DN20 galvanised female socket	each	\$ 10.00
DN20 galvanised tee	each	\$ 15.00
DN20 brass gate valve, FF, Norma	each	\$ 105.00
DN20 brass stop cock, TH FF	each	\$ 148.00
DN20 brass hose cock / R, TH FF	each	\$ 130.00
DN20 galvanised hex nipple	each	\$ 10.00
DN20 x DN15 galvanised reducing bush	each	\$ 9.00
DN15 Galvanised Steel Pipes and Fittings	Unit	Unit Price SBD
DN15 x 2.8 mm galvanised pipe x 900 mm, thread both ends	each	\$ 120.00
DN15 galvanised elbow x 90 degree	each	\$ 12.00
DN15 x 2.8 mm galvanised pipe x 600 mm, thread both ends	each	\$ 80.00
DN20 x 2.5mm galvanised pipe x 200 mm, thread both ends	each	\$ 230.00

These 2022 hardware costs are provided in Solomon Island dollars (SBD) by a major Honiara hardware supplier. You must also allow for transport to Kudu.

Assignment

Please complete your name, email address and postal address; and use the notes in this workbook to complete the assignment. Attach this page to the assignment and submit both to the tutor, or email to RodJohnstonAUS@gmail.com . The tutor will assess it and reply with comments and will complete the Training Certificate.

Name: _____ Email: _____

Postal Address: _____

Training Certificate

I hereby certify that

has completed course material in

Humanitarian Engineering – Introductory Level

prepared by Quasar Management Services Pty Limited.

Signed:

Name:

Date:



Quasar Management Services Pty Limited
ABN 21 003 954 210
Not-for-profit consulting structural and civil engineer
Subsidiary of Partner Housing Australasia (Building) Incorporated
69 Renwick Street, Redfern NSW 2016, Australia
Phone: +61 432 611 550
Email: RodJohnstonAUS@gmail.com

This certificate is valid only if signed and dated by an authorised officer of Quasar Management Services Pty Limited.

Disclaimer & Copyright

Disclaimer

This training package covers broad engineering principles and building practices, with particular emphasis on village infrastructure in the Asia-Pacific region. These broad principles and practices must be translated into specific requirements for particular projects by professional architects, engineers or builders with the requisite qualifications and experience. Associated sample specifications and drawings are available in electronic format, with the express intention that architects, engineers and builders will edit them to suit the particular requirements of specific projects. The design, construction and costing of structures must be carried out by qualified and experienced architects, engineers and builders, who must make themselves aware of any changes to the applicable standards, building regulations and other relevant regulations. The authors, publishers and distributors of these documents, specifications and associated drawings do not accept any responsibility for incorrect, inappropriate or incomplete use of this information.

Copyright

© Quasar Management Services Pty Ltd All rights are reserved. Permission is given for individuals to use this material in the preparation of designs, specification and contracts for individual projects. Permission is also given for not-for-profit Nongovernmental Organizations to use this material in the preparation of Training Programs and for the design, specification and construction of affordable housing and associated infrastructure in the Asia-Pacific region. Use of this material for any other commercial purposes prohibited without the written permission of the copyright owner. While most of this material is freely available via the internet, some is from Quasar Management Services and Partner Housing Australasia. We thank the University of Sydney for fruitful collaboration over several years.

