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for the GEF Pacific Ridge to Reef Programme

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Revised and Updated Environmental Stress Reduction of Targets of the Regional IW R2R Project

Recommendations:

The Committee is invited to:-

i. **Review and endorse** the methodology used to calculate estimated levels of area and pollution in order to review project countries' milestone targets; and

iii. **Note** the revised milestone indicators and **discuss** possible implications, if any.

Introduction:

1. In 2013 National IWRM Project Managers and teams in liaison with the RPCU, developed the national results frameworks for the GEF Pacific Regional International Waters Ridge to Reef Project (GEF IW R2R). During the intervening years, national priorities, sites, personnel and opportunities have changed. Thus the need to update the original results frameworks and their associated GEF Environmental Stress Reduction Targets to something relevant and achievable.

2. The following table highlights the original targets and the activities associated with them as per the GEF IW R2R Project Document (2015).

Municipal Waste Pollution Reduction
749kg/yr (34%) reduction of TN through constructed wetland system serving 15 houses in demonstration area in Nauru 1623 kg/yr (20%) TN reduction through 200 households septic system upgrades and construction of 15 sand filter on-site wastewater treatment systems in the demonstration area in Niue 2,255kg/yr (10%) TN reduction through 40 household on-site wastewater treatment system upgrades and construction of 40 eco-sanitation toilets in the demonstration area in Tonga 919 kg/yr TN and 503 kg/yr P reduction through conversion of 50 wash-down pigpens to dry-litter systems in Tuvalu
Pollution Reduction to Aquifer
7.6 kg/ha/yr TN pollution reduction to groundwater system from conversion of 50 piggeries to dry-litter system in Tuvalu 0.32 kg/ha/yr pollution reduction to groundwater system from on-site sanitation treatment system upgrades in demonstration area in Niue
Restored Habitat
10 ha of coastal area re-vegetated with salt and drought tolerant species at 10 critical sites in Nauru 1,200 ha of protected area re-vegetated in Samoa's Apia watershed (above 600m) 30 ha established and planted with rare endemic species in Vanuatu 5,598 ha of buffer area re-vegetated at Port villa demonstration site in Vanuatu
Conserved/Protected Fish Refugia Habitat
200 ha of fish refugia and wetland habitat protected through Integrated Coastal Management Plan for Honiara in the Solomon Islands 90 ha of conserved/protected fish refugia habitat in the development of coastal and fisheries management plans in Tonga
Catchment Protection Measures
8,018 ha under improved catchment management in Muri Lagoon area of Rarotonga, Cook Islands 1,905 ha under improved catchment management in Tofol, Kosrae, Federated States of Micronesia 4,608 ha under improved catchment management in Alofi North and Alofi South, Niue 7,151 ha of conserved/protected coastal area at Bibi in Madang Province, Papua New Guinea 544 ha under improved catchment management in the Laura Village, Majuro Atoll, Marshall Islands

3,027 ha proposed for improved management under Sustainable Land Use Strategy in Kovi/Kongulai catchment

2. As part of the project's mid-term review, in April 2019, the RPCU requested national IW R2R teams to review the anticipated end of project targets for their national activities that relate explicitly to the GEF environmental stress reduction targets. In some cases, this simply required reviewing for accuracy the area of extent of management plans. In others, it required a more detailed assessment of the feasibility of continuing a line of activities and re-evaluating the targets entirely.

3. In the first instance, national partners were encouraged to use their in-house GIS support and in the latter, the RPCU provided professional advice on ways to move the project forward given the resource limitations of the project.

4. This paper presents the methodology used by the RPCU to calculate and determine quantitative estimates of the milestone targets for national project logframes. The latest iteration of revised targets and related details is appended as ***Attachment 1***.

Key Issues:

5. There are issues associated with the calculation and making qualitatively estimates of the milestone targets for project countries.

(i) The boundary lines of demonstration sites, such as localised areas likely to be affected by or benefit from R2R interventions, including restored habitats and conserved fish refugia habitat, and lines depicting various ecosystems, land-use activities and others, are mainly drawn arbitrarily. These boundaries may be verified during the implementation of ground-truth activities;

(ii) The pollution levels from both human and animal wastes are calculated and estimated from a range of standards that result from studies carried out outside this region. While this is possibly acceptable, estimates based on standards derived from places closer to pollution sources is preferred.

(iii) However, there are no standards or case studies available in this region to use as basis for estimating levels of certain pollutants in piggery wastes.

6. As expected, the targets are subject to change as circumstances and priorities change in countries over time. For instance, the milestone targets agreed during earlier years of negotiation of the project funding from GEF may no longer be appropriate and therefore need changing. There are opportunities for reviewing these milestones, during inception workshops and, during major planning and developing of national development strategies and related high-level policy frameworks cross-sectorally.

Methods & Processes

Area for Catchment Protection Measures/ Restored Habitat/ Protected Fish Refugia Habitat

7. Relevant national IW R2R projects reviewed the original ***ha*** area figure, and with assistance from in-house GIS service or through the RPCU, defined the boundaries of project sites and calculated the area. The RPCU used QGIS software to determine the area of the sites.

Estimate loads for Municipal Wastewater Pollution Reduction / Pollution Reduction to Aquifers

8. Relevant national IW R2R projects reviewed the original target and underlying activity and provided the RPCU the following information:-

(i) updated activities;
(ii) number of households served through the various wastewater treatment approaches; and
(iii) number of piggeries and pigs served through the dry-litter piggery technology.

9. The RPCU prepared equations that calculate an estimate for the anticipated pollutant load reductions via the installation of compost toilet systems, on-site wastewater treatment system upgrades and dry litter technology for pig waste management.

10. The RPCU also consulted the literature in search of information on nutrient content of human faeces and urine and the efficacy of different waste treatment systems to generate average values for both. Several published papers contain data on nutrient content of human waste. The data chosen represent a range of locations yet presented with the same units of measurement. Key points from the papers:-

(i) Nutrient concentrations and BOD are higher in the global north than south, and average mass is higher in global south than north. This trend correlates with the amount of nutrients and fibre in local diets.
(ii) Estimates of efficiency of different on-site waste treatment systems to remove nitrogen from the waste stream were found in the literature and used as coefficients.

11. Data for the nutrient content of pig waste was derived from the American Society of Agriculture (ref.). The figures do not take in to consideration the different nutrient content and volume of waste from pigs that are raised in water-scarce environments and whose diet is significantly different from commercially raised American swine. No figures for nutrient content of pig waste in the Pacific were found.

12. These figures were used in simple equations that take the population and number of households, along with average nutrient content of daily waste and estimates the reduction of nutrients through the current systems, and anticipated reductions of nutrients through the proposed systems.

$$(nHH \times npHH \times avgN) \times 365 \times e = annual\ load\ per\ site$$

$HH = households$

$pHH = person/household$

$avgN = average\ nutrient\ content\ of\ waste\ per\ person\ per\ day$

$e = efficiency\ of\ treatment\ system$

Conclusion & Recommendations

13. There remain opportunities for further improvements in the methods with new and updated information as it becomes available. Other future studies may generate a range of possible estimates of nutrient concentrations and BOD of human and animal faeces and urine, and the efficacy of different waste treatment systems.

14. The importance of ongoing relevant and accurate information and standards generated from studies and researches closer to sources of pollution cannot be overstated. The project can recommend future research on this subject be taken up by graduate students, commercial farms and other research institutions.

15. The methods for calculating catchment and restored areas and habitats are as good as ground-truthing demarcated boundaries. Equally, the estimated loads for waste pollution can be improved with more applied research on nutrient contents of human and animal wastes closer to point source of pollution.

Attachment 1: Revised and Updated Environmental Stress Reduction of Targets of the Regional IW R2R Project

Country	Stress Reduction Measures	Specific Activity	Original Target	Updated Targets	Unit of Measure
Cook Islands	Catchment Protection Measures	Improved catchment management	8,018.00	600.00	Hectares
Fiji	Catchment Protection Measures	Mangrove Management	606.00	500.00	Hectares
FSM	Catchment Protection Measures	Improved catchment management	1,905.00	200.00	Hectares
Kiribati	Municipal Waste Pollution Reduction	Orig: Dry Litter Piggeries New: Conversion of 30 wash down piggeries to dry litter technology	229.00	955.00	TN kg/yr
Nauru	Municipal Waste Pollution Reduction	Constructed wetland	749.00	0	TN kg/yr
	Restored Habitat	Revegetation	10.00	10.00	Hectares
Niue	Catchment Protection Measures	ICM planning	4,608.00	200.00	Hectares
	Municipal Waste Pollution Reduction	Septic system	1,623.00	0	TN kg/yr
	Pollution Reduction in Aquifer	On site sanitation treatment	0.32	0	TN kg/yr
PNG	Catchment Protection Measures	Conserved/protected	7,151.00	220.00	Hectares
RMI	Catchment Protection Measures	ICM Plan	544.20	255.00	Hectares
Samoa	Catchment Protection Measures	Catchment Management Plans	12,740.00	12,740.00	Hectares
	Restored Habitat	Revegetation	1,200.00	1,648.00	Hectares
Solomon Islands	Catchment Protection Measures	Improved catchment management/ Sustainable Land	3,027.00	575.00	Hectares

		Use Strategy			
	Conserved/Protected Wetland	ICM Plan	200.00	200.00	Hectares
Tonga	Conserved/Protected Wetland	CFM Plans	90.00	90.00	Hectares
	Municipal Waste Pollution Reduction	Orig: Onsite waste water treatment New: Conversion of 6 HH sanitation systems to compost toilets	2,255.00	104.00	TN kg/yr
Tuvalu	Municipal Waste Pollution Reduction	Dry-litter piggeries	1,422.00	536.00	TN kg/yr
				150.00	TP kg/yr
	Pollution Reduction in Aquifer	Dry-litter piggeries	7.60	11.00	TN kg/yr
Vanuatu	Restored Habitat	Planted with Endemic Species	30.00	30.00	hectares
Vanuatu	Restored Habitat	Revegetation	5,598.00	2,570	Hectares