First Series Technical Consultation of the Regional Scientific and Technical Committee for the GEF Pacific Ridge to Reef Programme

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Session 3, Topic 2

From project to product: developing a multipurpose catchment database - concept note

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Summary:

This Concept note seeks to emphasis the value of spatial typography (and associated physical topography) and proposes that the R2R programme promote and encourage national-level sub projects and activities to advocate and, where possible, actively contribute to the establishment and improvement of national catchment databases. In this region "catchments" remain poorly defined and are not systematically captured anywhere in the R2R Programme. In simple terms, the problem can be phrased as a question of; "where are **all** the catchments and what are they like?" The paper proposes an activity that will likely add systemic value to the R2R Programme objectives.

Recommendations:

The R2R Technical Consultation is invited to:-

(i)   Consider and discuss the concept note giving consideration to proposals on what to do with all future R2R data particularly at the national level; and

(ii)   Discuss and agree on suggested options set out in the paper that enable the development of a catchment database for the R2R Programme region.

Introduction

1.   The R2R project covers geographies and themes that are linked by the fundamental principle of spatial interconnectedness between terrestrial and marine topography and the systems and processes that flow between them. Much valuable work has been done under the project components to generate the outputs and outcomes defined under the overall project objectives.

2.   Under R2R Programme Component 1, National multi-focal area demonstrations in all Pacific Island Countries, some of the outputs of this component refer to catchments, watersheds and other spatial typographies. This Concept Note seeks to emphasis the value of this spatial typography (and associated physical topography) and proposes that the R2R programme promote and encourage national-level sub projects and activities to advocate and, where possible, actively contribute to the establishment and improvement of national catchment databases.

Value of catchment data

3.   The topographical definition and properties of the various catchments being used for project activities under the R2R Programme are usually of a high-level nature, sufficient for general descriptive purposes (e.g. catchment area, length of rivers, highest elevation), but lack many of the more detailed properties required for more rigorous modelling and comparative analysis. These properties include detailed DEM, slope, hydrography, stream order and sub-catchment hierarch. Combining this fundamental topography with land cover, precipitation, hydro-geology and soil properties provides a basis for more detailed run-off modelling.

4.   The value of this kind of modelling towards the technical outputs of the R2R programme is significant, and more so if it was available comprehensively across a country. This would allow national-level analysis and simulation and provide the opportunity for comparative analysis between catchments.

Current data status

5.   All the countries in the Pacific region, including those covered by the Pacific R2R Programme have national topographic mapping products and activities in place. For most countries, these products and activities are based on traditional cartographic approaches and outputs e.g 1:50k scale printed topographic maps derived from aerial photography and manual stereography. Much of this data (in many cases over 50 years old) has been converted into digital topographic products for use in GIS. The use of this data in GIS has been largely restricted to digital cartography rather than deriving value-added spatial products or improving accuracy.

6.   In recent years a number of countries have started to use more modern topographic capture technologies such as satellite image stereography and LiDAR. These have predominantly been project-driven, covering relatively small areas, for project specific outputs e.g. coastal inundation simulation. These new technologies improve spatial accuracy and data collection time, but have generally not resulted in the production of more sophisticated topographic products such as catchment models.

Requirements for catchment modelling

7.   With modern GIS software and computing power, it is relatively straight-forward to create catchment models from existing spatial data. Starting from a worst-case situation where the starting point is a printed topographic map with contour lines, the steps to create a catchment model are all achievable with desktop hardware and free GIS software tools.

8.   In most cases, the basic analog to digital conversion has already been done, so the starting point is usually a set of digital contour lines, or even a DEM. From this point, all the tools and computing resources to generate catchment models are readily available. These models can then be shared as spatial data products.

9.   A key aspect of converting this data into a value-added product is the establishment of standards and metadata for the data processing. While often poorly understood, existing topographic data is widely used and trusted as it originates from an authoritative source (such as a national mapping agency). A derived product such as a national catchment dataset would benefit significantly from having a similarly authoritative source, based on the source organisation and data processing history.

Suggested actions

10.   To enable the development of a catchment database for the R2R Programme region, the following high-level steps are suggested:

- Define target countries and spatial scale - the different types of topography in the countries in the R2R Programme area will require some categorisation of appropriate spatial scale and catchment data requirements. High island countries with well developed topography would likely be suitable for catchment data development at 1:25k scale, whereas small atoll countries may not even generate any significant value from such an exercise
    - Output 1 - categories of countries suitable for catchment database development
- Establish catchment data standards metadata - based on an evaluation on relevant catchment dataset standards and metadata (e.g. ANZLIC, FGDC, ISO and local national standards where available), determine a standard suitable for both the R2R Programme and the on-going maintenance of the dataset at a national level
    - Output 2 - data standards and metadata for national catchment dataset
- Evaluate available topographic data - with the aim of assessing completeness and level of effort required to develop and maintain the data, develop a project plan to create and maintain the dataset
    - Output 3 - project plan that identifies gaps, resource requirements, tasks and time frames for creation and maintenance of the data set
- As a result of the gaps and resource requirements identified in Output 3, the following support actions may be required
    - Output 4 - data collection programme for any data gaps identified, and associated funding plans and proposals
    - Output 5 - data processing training for technicians to create and maintain the dataset in compliance with the standards and metadata identified in Output 2
    - Output 6 - establish and support a MEAL framework for this dataset. This may simply be an extension of the existing frameworks for the R2R Programme itself

From project to product

11.   This concept note proposes an activity that will likely add systemic value to the R2R Programme objectives. It is a relatively minor technical enhancement to existing data that is widely referenced across many activities in the R2R Programme. However "catchments" remain poorly defined and are not systematically captured anywhere in the Programme. In simple terms, the problem can be phrased as a question of; "where are **all** the catchments and what are they like?"

12.   The wider implication of this proposed activity is to promote the value of developing systematic datasets of long-term, multi-sectoral value. Much of the technical data being developed for this R2R Programme is likely to have limited re-useability, as it is site and time specific. While this provides a valuable resource for point-in-time/place comparison, it does not lend itself to long-term re-use and value-adding opportunities. A series of national, suitably authoritative catchment datasets would be a valuable and tangible output of the Programme.

13.   While projects generally produce quantities of data and associated material, few of them can be productised with long-term and external value. This proposal presents the opportunity for a practical output of the Programme, and may be used as an example of the "productisation" of project collateral.