

ABSTRACT

Community plans for small islands have typically been prepared with little or no concern for the groundwater resources necessary to support the plans. This dissertation provides a prescriptive approach enabling a better understanding of the physical characteristics of small islands through investigations on North and South Pender Islands. These physical characteristics control the water storage, supply and allocation. The prescriptive approach to investigating the physical setting presented includes: airphoto interpretation, remote sensing, geologic mapping, geophysical investigations, review of water well data, review of climatic data, and laboratory analysis. On the basis of this approach, it is possible to subdivide an island into groundwater basins and provide an estimate of the groundwater storage capacity and extractable groundwater for each groundwater basin.

A review of the existing water systems in the case study area in conjunction with the existing legal and institutional frameworks was required to support the physical setting and reduce the risks associated with policy decisions. For the case study, a conceptual model for governance on a groundwater basin level is presented that is incorporated into the existing governance structure.

Regardless of the approach taken to determine the physical setting, there is potential for a high degree of uncertainty simply due to measurement inaccuracies that results in risks impacting both water quantity and quality. The risks associated with groundwater resource assessment and management are shown to vary both temporally and spatially.

Both benefits and barriers to implementation for the proposed prescriptive approach are presented. Recommendations for the case study area are presented within the perspective of the existing water supply systems.

Key words: groundwater resources, geologic mapping, geophysical investigations, management, small islands, community planning, storage capacity, physical setting, governance, risk, water balance, groundwater basin.