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REVIEWER'S REPORT

Manuscript No.: IJAR- 59634

Title: COMPREHENSIVE ASSESSMENT OF WATER DEMAND, SUPPLY DEFICIT, AND SUSTAINABLE MITIGATION STRATEGIES: A CASE STUDY OF CHOULDARI GRAM PANCHAYAT, SOUTH ANDAMAN.

Recommendation:
Accept as it is .....
Accept after Minor revision.....
Accept after Major revision
Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity			✓	
Significance			✓	

Reviewer Name: Dr. ANAPANA GOPAL

Reviewer's Comment for Publication.

General Comments
The manuscript examines water availability, demand-supply gaps, agricultural water requirements, population growth, and sustainable water management strategies in Chouldari Gram Panchayat, South Andaman, Andaman and Nicobar Islands. The study addresses an important environmental and developmental issue, particularly in island ecosystems where geographical conditions, seasonal rainfall variability, and increasing domestic and agricultural demands can create challenges for sustainable water-resource management.
The manuscript combines demographic information, hydrological field surveys, GIS-based spatial mapping, water-demand calculations, population forecasting, and proposed mitigation strategies. The identification of additional water sources, watershed development measures, and household-level greywater recycling systems provides a potentially useful framework for addressing local water scarcity.
The study has practical relevance for rural water-resource planning and local administration. However, several methodological and reporting issues need to be addressed before the manuscript can be considered for publication. In particular, the survey methodology is insufficiently described, some water-demand and supply projections require verification, and the proposed mitigation estimates are not adequately supported by detailed calculations. The GIS analysis and agricultural water-demand assessment also need further clarification.
The manuscript would benefit from improved quantitative consistency, clearer methodological documentation, and a stronger discussion of the technical feasibility and long-term sustainability of the proposed interventions.
Content and Originality
The manuscript addresses a relevant and locally significant research problem by examining water-resource availability and management in an island Gram Panchayat.

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The integration of domestic water-demand assessment, agricultural requirements, population forecasting, and GIS mapping provides a useful multidisciplinary approach.
The identification of three potential additional water sources and the proposal to combine source augmentation with watershed management and greywater recycling are important practical components of the study.
However, the authors should establish the specific research gap more clearly and explain how the present study advances existing knowledge on rural water-resource management in island ecosystems.
The manuscript should also distinguish more clearly between existing water resources, currently operational supply infrastructure, and potential sources that require further investigation. The proposed mitigation framework should be supported by quantitative evidence demonstrating how each intervention contributes to reducing the identified water deficit.
The originality of the study would be strengthened by presenting a more integrated assessment of domestic consumption, agricultural requirements, seasonal water availability, and environmental sustainability rather than focusing predominantly on the domestic supply deficit.

Technical Quality

The manuscript requires significant improvement in its research methodology, quantitative calculations, and interpretation of water-resource availability.
1. Survey methodology: The manuscript mentions that a survey was conducted by the Island Water Resource Research Center (IWRRC), but the methodology is not adequately described. The authors should provide the survey period, number of households or respondents, sampling procedure, questionnaire details, and methods used to collect and validate the hydrological information.
2. Water-demand calculations: The manuscript estimates the domestic water requirement at approximately 4.3 lakh litres per day, based on a population of 4,323 and a consumption requirement of 100 litres per capita per day. The authors should clearly explain the basis for selecting this consumption standard and verify its applicability to the study area. The calculation should also distinguish between total theoretical demand and actual household consumption.
3. Supply-deficit assessment: The manuscript reports an existing water supply of approximately 1.66 lakh litres per day against a demand of 4.3 lakh litres per day, resulting in a deficit of approximately 2.66 lakh litres per day. These calculations should be presented consistently throughout the abstract, results, figures, and conclusion. The authors should also clarify whether the reported supply represents actual daily delivery or an average calculated from scheduled distribution.
4. Population forecasting: The authors use three population forecasting methods to estimate future requirements up to 2050. However, the mathematical equations, assumptions, baseline population values, and individual forecasting results are not adequately explained. The authors should provide the details of all three methods and justify the selection of the forecasting approach used for future water-demand estimation.
5. Seasonal water availability: The GIS and hydrological assessment refers to field observations conducted during May–June. However, the authors also acknowledge that quantitative and qualitative assessments of individual water sources are required during both monsoon and dry seasons. The authors should clarify the limitations of

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the existing seasonal observations and provide additional evidence before drawing conclusions about perennial groundwater availability.

6. GIS spatial analysis: Figures 1.2–1.5 present the locations of villages, streams, ponds, and wells. However, the GIS methodology is insufficiently described. The authors should specify the data sources, coordinate reference system, mapping scale, spatial layers, field verification procedures, and software used. The maps should also include appropriate legends, scale bars, north arrows, and clearly identifiable locations.

7. Agricultural water-demand assessment: The manuscript discusses paddy cultivation, vegetables, and cash crops, with estimated water requirements of 900–1,300 mm for paddy and 400–600 mm for vegetables. The authors should explain the assumptions and calculation methods used to estimate agricultural water demand. The cultivated area, crop duration, rainfall contribution, irrigation requirements, and crop-specific water consumption should be clearly distinguished.

8. Proposed additional water sources: The manuscript identifies one proposed large-diameter dug well and two perennial stream sources, with an estimated additional supply of approximately 3 lakh litres per day. However, these estimates are based on present yields that the authors themselves state require validation during dry months. The authors should provide discharge measurements, seasonal observations, and hydrogeological evidence to establish the reliability of these sources before treating the estimated yield as an assured supply.

9. Supply expansion calculations: There is an important numerical inconsistency between the proposed additional supply described in the text and the values presented in Figure 1.13. The manuscript states that approximately 3 lakh litres per day will be added to the existing supply of 1.66 lakh litres per day. However, the figure appears to present a proposed supply of approximately 3.67 lakh litres per day rather than 4.67 lakh litres per day. The authors should verify the calculations and reconcile the text, figure, and projected supply deficit.

10. Greywater recycling estimates: The manuscript reports 1,043 households and estimates greywater generation at 180 litres per household per day, giving a total of 187,740 litres per day. The authors should explain the basis of the 180-litre estimate and clarify whether this represents measured or literature-derived greywater production. The expected recoverable volume after treatment, treatment efficiency, water-quality requirements, and suitability for agricultural reuse should also be discussed.

11. Technical feasibility of mitigation measures: The proposed upflow-downflow filtration systems, watershed structures, contour bunding, check dams, farm ponds, and percolation ponds are relevant interventions. However, their implementation requirements, maintenance, land availability, approximate costs, and expected water-recharge benefits are not discussed adequately. These aspects should be considered before recommending them as sustainable solutions.

12. Environmental and water-quality assessment: The manuscript focuses mainly on water quantity and availability. However, the quality of water from dug wells, ponds, streams, and treated greywater is equally important. The authors should discuss the need for physical, chemical, and microbiological water-quality assessment, particularly before recommending domestic or agricultural reuse.

13. Uncertainty and sustainability: The projected water availability up to 2050 depends on population trends, rainfall variability, seasonal stream discharge,

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groundwater recharge, and agricultural demand. The authors should acknowledge these uncertainties and consider alternative scenarios rather than presenting the projections as assured future outcomes.

Language and Presentation

The manuscript is generally understandable, but comprehensive language editing and technical proofreading are necessary to improve readability and scientific presentation.

- Correct grammatical errors, spelling mistakes, punctuation, and inconsistent spacing throughout the manuscript.
- Standardize the spelling of the study area, particularly the use of "Chouldari" and "Chouldhari," throughout the title, text, and figure captions.
- Use consistent terminology for water demand, water supply, water deficit, groundwater recharge, greywater generation, and irrigation requirements.
- Standardize numerical expressions, including lakh and litre measurements, and use consistent SI units wherever possible.
- Correct typographical errors such as "Argumentation" instead of "Augmentation" in Figure 1.12.
- Improve sentence construction in the sections discussing GIS mapping, population forecasting, and agricultural water requirements.
- Ensure that abbreviations such as GIS, APWD, LPCPD, NIR, ICAR, and NEERI are expanded at their first occurrence.
- Improve the quality and resolution of figures, particularly Figures 1.1, 1.6, 1.9, 1.11, and 1.13.
- Ensure that all figure captions are grammatically correct, informative, and consistent with the corresponding discussion.

Particular attention should be given to the clarity of quantitative statements and the consistent presentation of water-resource calculations.

Structure and Organization

The manuscript follows a logical sequence, beginning with the geographical and demographic characteristics of the study area, followed by hydrological assessment, GIS mapping, water-demand estimation, agricultural requirements, and proposed mitigation measures. However, several sections require restructuring to improve scientific clarity.

- Abstract: Clearly state the survey methodology, principal quantitative findings, current supply deficit, and expected contribution of the proposed mitigation measures. Ensure that all numerical values agree with the main text and conclusion.
- Introduction: Strengthen the research background by discussing water scarcity in island ecosystems and clearly identifying the research objectives and knowledge gap.
- Hydrological Assessment: Provide more detailed information about the water sources, household survey findings, seasonal availability, and existing water-supply infrastructure.
- GIS Spatial Mapping: Explain the GIS methodology and improve the presentation of maps with appropriate legends, scale bars, and geographical references.
- Water Requirement Analysis: Present domestic water demand, existing supply, and the calculated deficit systematically, with transparent calculations.

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- Population Forecasting: Explain the three forecasting methods, their assumptions, and the basis for estimating future water requirements up to 2050.
- Agricultural Water Demand: Provide a clearer assessment of crop-wise water requirements, cultivated land areas, rainfall dependency, and irrigation practices.
- Proposed Mitigation Framework: Organize the proposed interventions into source augmentation, watershed development, groundwater recharge, and household-level greywater treatment.
- Figures and Tables: Improve the quality, labelling, numbering, and readability of all figures. The quantitative information presented in the figures should be consistent with the corresponding text.
- Conclusion: Summarize the principal findings and distinguish between currently available water resources, estimated additional supply, and potential greywater recovery.

The manuscript would benefit from including a consolidated table comparing existing water demand, available supply, proposed additional sources, greywater generation, and the expected remaining deficit under different mitigation scenarios.

References and Citations

The manuscript includes references from government departments, technical institutions, and water-management organizations, including BIS, ICAR, CSIR-NEERI, CPREEC, and WaterAid India. These references are relevant to the subject, but the reference section requires further improvement.

- Verify the accuracy and completeness of all bibliographic details, including institutional authors, publication years, report titles, and publication information.
- Ensure that all in-text citations correspond to the appropriate entries in the reference list.
- Correct the reference numbering, as reference number 8 appears to be missing.
- Standardize the reference format according to the journal's prescribed guidelines.
- Provide appropriate references supporting the population forecasting methods and hydrological calculations.
- Ensure that the standards used for domestic water requirements and irrigation-water quality are correctly interpreted and applied.
- Include additional recent research publications on island hydrology, groundwater recharge, rural water-resource management, and decentralized greywater treatment.
- Support the proposed upflow-downflow filtration system with relevant technical studies and evidence concerning treatment efficiency and reuse safety.
- Provide appropriate sources for the estimated greywater generation and crop-specific water requirements.

The authors should ensure that the technical recommendations and quantitative estimates are supported by reliable and traceable references.

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Overall Recommendation
Minor Revision
The manuscript addresses an important environmental and developmental issue concerning sustainable water-resource management in island communities. The integration of demographic assessment, hydrological observations, GIS mapping, agricultural water-demand estimation, and proposed mitigation strategies provides a useful foundation for local water-resource planning.
The identification of potential additional water sources, watershed development measures, and household-level greywater recycling demonstrates practical relevance.
However, the manuscript requires substantial improvements in survey methodology, quantitative calculations, population forecasting, GIS presentation, and validation of proposed water sources. The inconsistencies in the projected water supply and greywater estimates should be corrected. Furthermore, the technical feasibility, water-quality requirements, and long-term sustainability of the proposed interventions need stronger scientific justification.
Addressing these concerns would significantly improve the scientific reliability, methodological transparency, and practical contribution of the manuscript.

Final Decision
Minor Revision.
The manuscript may be reconsidered for publication after the authors address the methodological and numerical inconsistencies, provide adequate details of the survey and forecasting procedures, strengthen the GIS and hydrological assessments, and validate the estimated contributions of the proposed mitigation measures.
Particular attention should be given to reconciling the existing and proposed water-supply calculations, verifying the greywater generation estimates, and demonstrating the seasonal reliability of the identified water sources.
A further review is recommended after resubmission to determine whether these scientific and technical concerns have been satisfactorily addressed.