- **Monitoring programs** should be established in high-impact subbasins to track long-term trends in nutrient and sediment loading.

This comprehensive water quality assessment provides actionable insights into pollutant dynamics in the watershed, serving as a foundation for designing sustainable land and water conservation measures.

Chapter Five

Conclusion and Recommendations

5.1 Conclusion

This study assessed the spatial variations of key water quality parameters—organic phosphorus, nitrate, and sediment loads—across different subbasins within the Ogunpa River watershed.

The findings reveal a highly uneven distribution of pollutant inputs across the watershed. Subbasins 1, 2, 3, 4, and 6 emerged as critical areas contributing the highest loads of organic phosphorus, nitrate, and sediment. These elevated pollutant levels are largely attributed to intensive agricultural activities, urban runoff, improper land management, and possible point-source pollution such as sewage discharge. In contrast, subbasins such as 5, 9, 12, and 14 recorded relatively low pollutant inputs, indicating areas with lower land use intensity or more effective natural buffering processes.

The cumulative pollutant loads—23,095.35 kg of organic phosphorus, 263,741.95 kg of nitrate, and 712,072.62 tons of sediment—underscore the urgent need for effective watershed management strategies. The spatial analysis conducted highlights the importance of targeting high-risk subbasins to improve water quality and protect the ecological health of the Ogunpa River system.

Ultimately, the study provides a scientific basis for implementing sustainable land and water management practices within the watershed, ensuring long-term environmental protection and better water resource management for the surrounding communities.

5.2 Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. **Targeted Intervention Programs**
   Management efforts should focus primarily on subbasins 1, 2, 3, 4, and 6, where pollutant loads are highest. Interventions such as improved agricultural practices, fertilizer management, and urban runoff controls are essential.

2. **Implementation of Erosion Control Measures**
   Subbasins with high sediment yields should adopt soil conservation techniques, such as reforestation, terracing, cover cropping, and the construction of check dams, to reduce erosion and sediment transport.
3. **Establishment of Riparian Buffer Zones**
   protecting and restoring natural vegetation along riverbanks, especially in high-risk subbasins, would help filter pollutants before they reach the river and stabilize riverbanks against erosion.
4. **Strengthening of Regulatory Policies**
   Strict enforcement of land use and waste management regulations is needed to control point and non-point source pollution within the watershed.
5. **Promotion of Sustainable Agriculture**
   Farmers within the watershed should be encouraged to adopt nutrient management plans, use organic fertilizers, and apply precision agriculture techniques to minimize fertilizer runoff into nearby waterways.
6. **Continuous Monitoring and Evaluation**
   A watershed-wide water quality monitoring program should be established to track changes over time, identify emerging pollution sources, and evaluate the effectiveness of management strategies.
7. **Community Engagement and Education**
   Raising awareness among local communities about the impact of human activities on water quality and involving them in watershed management initiatives will enhance the sustainability of interventions.
8. **Further Research**
   Additional studies are recommended to investigate seasonal variations in water quality, groundwater-surface water interactions, and the specific contributions of different land use types to pollutant loads.