

on institutional demand. Increased agriculture coverage (blue line) also shows an upward trend, though lower than high population growth, suggesting increased institutional demand potentially due to support systems for agriculture (e.g., administration, irrigation management offices).

The extended wet season (yellow line) is slightly above zero and relatively stable over time. Suggesting minimal impact on institutional water use. Institutional water demand is likely not weather-dependent. The extended dry period (red line) stays below zero, indicating a slight reduction in water demand compared to the reference. This may imply either reduced availability, conservation measures, or lower usage due to reduced service delivery during droughts.

Institutional demand is highly sensitive to population growth but less affected by climate (wet or dry) conditions. The green scenario (high population growth) is a critical scenario to monitor for infrastructure planning. While agricultural expansion does affect institutional water use, its impact is moderate. Climate scenarios have a limited effect on institutional demand, possibly because such demand is more stable and less seasonal. This increase underscores the need for efficient technologies and wastewater reuse to support institutional expansion.

4.3.5 Agricultural and industrial water demand relative to reference scenario

Figure below presents agricultural demand under the increased agriculture coverage scenario. The demand needs increase significantly, especially during dry months. While dry-season shortfalls call for efficient irrigation, improved storage, and adaptive management (Figure 11).

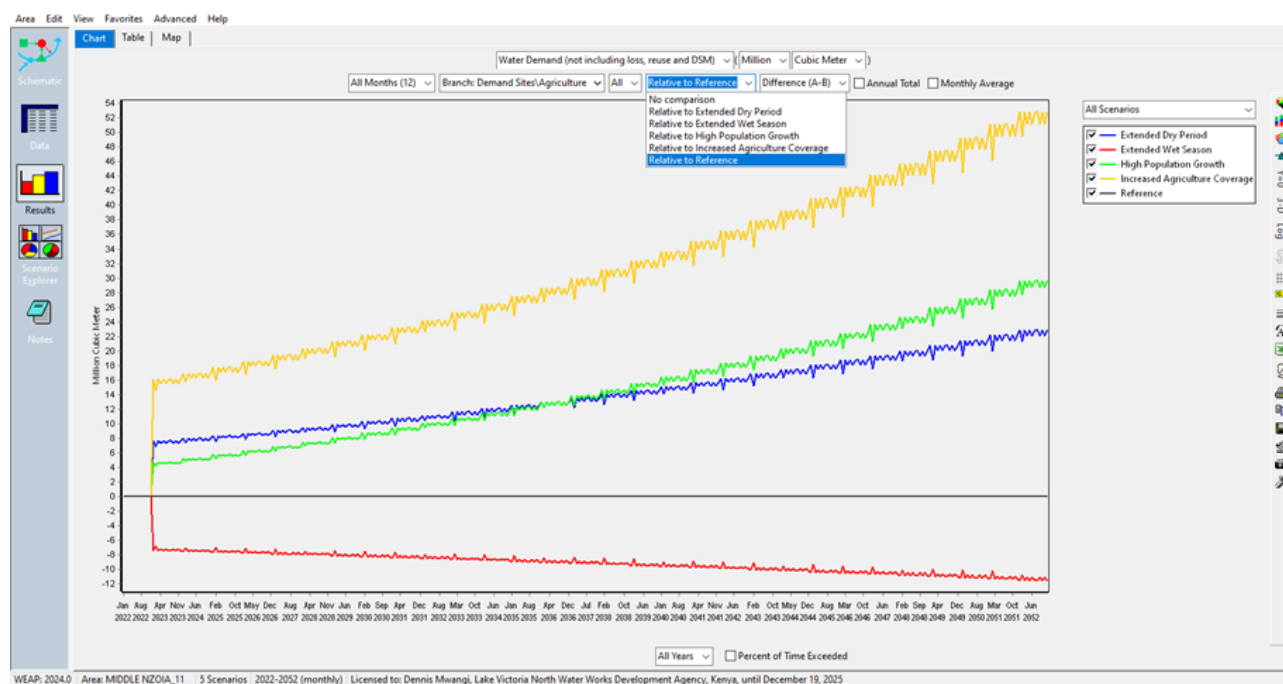


Figure 11 Agricultural water demand relative to reference scenario (Source: Researcher (2025))

Industrial demand, shown in Figure 4.19, rises steadily. The Industrial Growth Scenario surpasses $400 \times 106 \text{ m}^3$ by the year 2052, compared to under $304 \times 106 \text{ m}^3$ in the reference scenario.

The crisscrossing behavior between the extended dry period and high population growth scenarios is because of water demand composition difference ie. Extended dry Period affects agricultural water demand significantly, while high population growth impacts municipal and industrial demand more. As urban demand becomes more significant (due to exponential population growth), the high population growth scenario overtakes the dry period curve (Figure 12).