# Chapter 32
# Role of Water–Energy–Waste Inter–Relatedness to Drive Sustainability amid Climate Concerns

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## ABSTRACT

*The Sustainability value parity framework is proposed to deepen the understanding of the importance of 'inter-relatedness' of water-energy-waste with the goal of balancing water usage, aligning energy intensity and optimizing waste utilization. Generic waste that is burgeoning is a deterrent to the practice of sustainability that aligns water, energy, infrastructure, health, food, and lifestyle (Sachs, 2007). This chapter delineates the gap between globalization at the macro-level and global citizenry at the grassroots-base and posits a value bridge assessed by appropriate thresholds of water - energy - waste. The emergent need to strengthen climate resilience and to usher into the sustainable pathway of climate-proofed development needs tuning of processes, lifestyle, hazardous substances and consumption. Climate change manifests as an over-arching risk that is strewn with unpredictability, multiple dimensions, uncertainties, spikes, imbalances leading to inequity.*

## INTRODUCTION

The Asia Pacific is straddled with rapid growth vis-a-vis emergent need for sustainability practice that aligns development with value parity on water - energy - waste. The Sustainability value parity has the ability to balance water usage, align energy intensity and optimize waste utilization. 2050 scenarios on climate change, food, security, ecosystems, bio-diversity and ecological productivity is grim. The growth

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aspirations are emphatic across Asia and the Pacific, which is in tandem with other global growth nodes. In this milieu, the root-core attributes of sustainability value creation would substantively depend on how water - energy - waste parity is maintained. Extended Exergy Analysis is an emerging methodology that inter-weaves technology with economics on one part, as well as exergetic balance of labor and environmental remediation expenditures (Golberg, 2015). Climate change is "unequivocal" with it's impact on water evident from warming oceans and water bodies, rise in water levels, precipitation trends display strong variability, water bodies have absorbed over 30 percent of emitted anthropogenic carbon dioxide intensifying acidification that is detrimental to agriculture and may trigger food insecurity. Climate unpredictability, disaster recurrence and greenhouse proliferation, triggers severe warnings to sustainability-critical resources like water – energy – land – air (Giovannucci et. al., 2012). Sectors, such as, food, infrastructure, health, transportation and telecom production faces multiple limiting factors or value-parity thresholds for waste that needs to be dynamically harnessed with respect to water – energy sustainability.

This crisis has potential to manifest as Sustainable Development Goal (SDG) – compliant innovations on technology, climate proof financing, disaster resilient habitats. Water – energy – waste sustainability are key enablers for inclusion, environmental sustainability, and regional integration in the Asia Pacific (Thomas, 2015). Economic, societal and environmental outcome evaluation would lead to enhanced outcomes with sustainable results by climate-resilient and inclusive infrastructure pathways. Generic waste, has stockpiled that are attributable to processes, lifestyle, hazardous substances and use-and-throw lifestyle. Risks and uncertainties proliferate, businesses are no longer usual with spikes, imbalances, inequities, non-uniformities and unpredictability becoming the norm (Miller, 2015). With 2010 ~ 2014 being one of the most climate variable years on record since 1998, climate concerns are ever increasing. Unpredictable extreme weather devastations tend to pose as the predominant and overarching challenge. All other developments would be meaningless without the ecology thriving along with growth of economy.

## Motivation

Is it feasible to align economy, ecology and society through the practice of sustainability? The key action-essence is to reach a dynamic balance. The diverse perspectives of the key actors or stakeholders, such as the processors, the private sector, the service providers, the community, the typical locale-specific issues, need to be kept aligned sustainably. The policies, management structure, enforcement, adoption, and innovation needs to respond quickly to the inertial imbalances, inequities and non-uniformities. This chapter proposes a framework to align the governance with resource usage that lead to dynamic equilibrium termed as water - energy - waste parity.

## Gaps

Aim of this chapter is to broad-base the impacts of climate change beyond the primary focus on water supply, usage, and management to the inter-relatedness among water - energy - waste. This extended purview would help better formulate and understand the multiple benefits that may be derived from climate resilience with waste-to-energy opportunities, water-waste nexus and water - energy inter-dependency. Policy makers, processors/service providers, grassroots community and other stakeholders