



# Land Reclamation in the Maldives: Trends and Impacts from 2000 to 2024

Hussain Ziyath<sup>1,\*</sup>, Eden Rigo<sup>2</sup>, and Fathimath Shanna<sup>1</sup>

<sup>1</sup> *Charrette Studio, Male', Maldives;*

<sup>2</sup> *School of Design and Built Environment, Faculty of Humanities, Curtin University, Australia;*

*\*Corresponding: Ziyath@charrettestudio.mv;*

**Abstract:** Land reclamation has become a dominant spatial development strategy in the Maldives, yet no comprehensive national dataset has previously documented its scale or patterns across inhabited islands. This study analyses land reclamation projects undertaken between 2000 and 2024 for community use across all 189 inhabited islands. Using a mixed-methods approach, the research compiles a spatially explicit database of 109 projects through satellite imagery analysis, desktop review of Environmental Impact Assessments, government records, and Geographic Information Systems mapping. The findings reveal extensive reclamation, with more than 4,000 hectares added during the study period. This scale is exceptional, exceeding the combined total reclaimed across Africa and Europe since 2000 when compared with global reclamation data [1]. Spatial analysis shows a strong concentration of projects in the Central Region, fragmented development patterns, duplication of major infrastructure within atolls, and a pronounced surge in reclamation following the transition to a multi-party governance system after 2008 [2]. The study further identifies a misalignment between reclamation allocation, demographic trends, and long-standing national decentralization policies. These findings raise critical questions regarding the adequacy of regulatory frameworks, the absence of coherent national planning, and the long-term environmental and social consequences of standardized reclamation practices [3, 4]. The paper concludes by calling for a recalibration of land reclamation policy to better align development objectives with demographic realities, environmental resilience, and community benefit.

**Keywords:** Land Reclamation; Maldives; Inhabited Islands; GIS; Coastal Development.

## 1. INTRODUCTION

### 1.1 Background

Land reclamation has historically been used worldwide to address land scarcity, facilitate economic development, and reshape coastal environments [5, 6]. In recent decades, the pace and scale of reclamation have accelerated significantly, particularly in rapidly developing coastal regions [1].

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In the Maldives, an atoll nation characterized by extreme land scarcity and low elevation, land reclamation has become a central instrument of modern development [7, 8]. Reclamation is commonly framed as a response to population growth, urban congestion, and climate-related risks, particularly sea-level rise [9]. Between 2004 and 2014, more than 60 percent of Maldivian islands experienced human-induced physical change, with land reclamation playing a dominant role [8].

Despite its prominence, land reclamation in the Maldives has proceeded without a consolidated national evidence base. Existing scholarship has focused on environmental impacts, island morphology, and climate adaptation challenges [3, 10, 11], yet no comprehensive study has documented the extent, typologies, and spatial distribution of reclamation across inhabited islands. This absence limits the ability to evaluate whether reclamation practices align with demographic needs, development policies, and environmental risks.

This paper addresses that gap by systematically mapping land reclamation undertaken for community use across all inhabited islands between 2000 and 2024.

## 1.2 Regional Context

The Maldives comprises 1,190 natural islands organized into 26 atolls, of which 189 are inhabited [12]. Land constitutes approximately one percent of the country's reef system, making it among the most land-scarce nations globally [7]. Population distribution is highly uneven, with more than 40 percent of residents concentrated in the Central Region, particularly within the Greater Malé region [13].

To enable comparative analysis, this study adopts a regional framework aligned with national spatial planning divisions, grouping atolls into Northern, Central, and Southern regions [14]. These regions differ substantially in average island size, lagoon availability, population density, and development pressure, all of which influence reclamation activity.

## 2. LITERATURE REVIEW

### 2.1 Land Reclamation and Development

Land reclamation is commonly defined as the creation of new land through the infilling of marine or lagoon environments, either as extensions of existing land or as entirely new islands [5]. Globally, reclamation has expanded rapidly since 2000, particularly in East Asia and other fast-growing coastal regions [1].

Large-scale global assessments demonstrate that reclamation has become a major driver of coastal urbanization and infrastructure expansion [15]. However, small island states such as the Maldives are often excluded from these analyses due to population thresholds, despite experiencing disproportionately high levels of land transformation relative to their size [8].

### 2.2 Benefits, Costs, and Risks

In the Maldives, land reclamation is frequently justified as a means of alleviating land scarcity, enabling housing provision, supporting economic infrastructure, and adapting to coastal flood risk [7, 9]. Shallow lagoon depths and sediment availability make reclamation

technically feasible, while low island elevation renders land raising an attractive adaptation strategy [16].

However, a growing body of literature highlights the environmental and social costs of reclamation. Reclamation disrupts coral reef systems that act as natural coastal defenses, often increasing wave energy, erosion, and flood exposure [17]. Standardized engineering approaches frequently overlook island-specific geomorphology, resulting in drainage problems and heightened vulnerability to sea-level rise [10].

Social impacts include inadequate community engagement, weak enforcement of Environmental Impact Assessment requirements, and limited post-reclamation monitoring [18, 19]. These shortcomings are particularly pronounced in public infrastructure projects on inhabited islands.

### 2.3 Policy and Governance Context

Land reclamation in the Maldives is regulated under the Dredging and Reclamation Regulations Act, which mandates Environmental Impact Assessments for large-scale projects. Despite this requirement, implementation has been criticized for limited transparency, pre-approval of projects, and weak compliance monitoring [19, 20].

Guidelines for climate-resilient coastal protection provide recommended reclamation elevations and design principles but remain non-binding [16]. These guidelines have been criticized for failing to account for long-term sea-level rise projections and site-specific shoreline dynamics [21, 22].

The absence of a national development or spatial planning framework since 2008 has further weakened strategic coordination, contributing to fragmented and reactive reclamation practices.

## 3. METHODOLOGY

The study captures land reclamation projects exceeding one hectare, undertaken within inhabited islands or local council boundaries for community use between 2000 and 2024. Resort-only projects were excluded.

An initial project list was compiled using national datasets, including the Multi-Hazard Risk Atlas of the Maldives [23]. This list was expanded through systematic satellite imagery analysis using Google Earth Engine to identify reclamation activity across all inhabited islands. Identified projects were cross-validated using Environmental Impact Assessments, government-owned enterprise reports, official announcements, and media sources.

Each project was coded by location, region, typology, intended purpose, project status, commencement year, and reclaimed area. Geographic Information Systems were used to spatially map projects and analyse regional and temporal patterns.

Data limitations were more pronounced for projects prior to 2010 due to restricted imagery availability and incomplete documentation. Reported reclamation areas may therefore underrepresent final post-development extents.

## 4. FINDINGS

### 4.1 Extent and Distribution

Between 2000 and 2024, 109 land reclamation projects were identified across 69 inhabited islands in 18 atolls (Figure 1). This indicates that one in three inhabited islands has undergone reclamation. Of these projects, 85 were completed, 19 were ongoing, and five remained proposed but unimplemented at the time of this study.

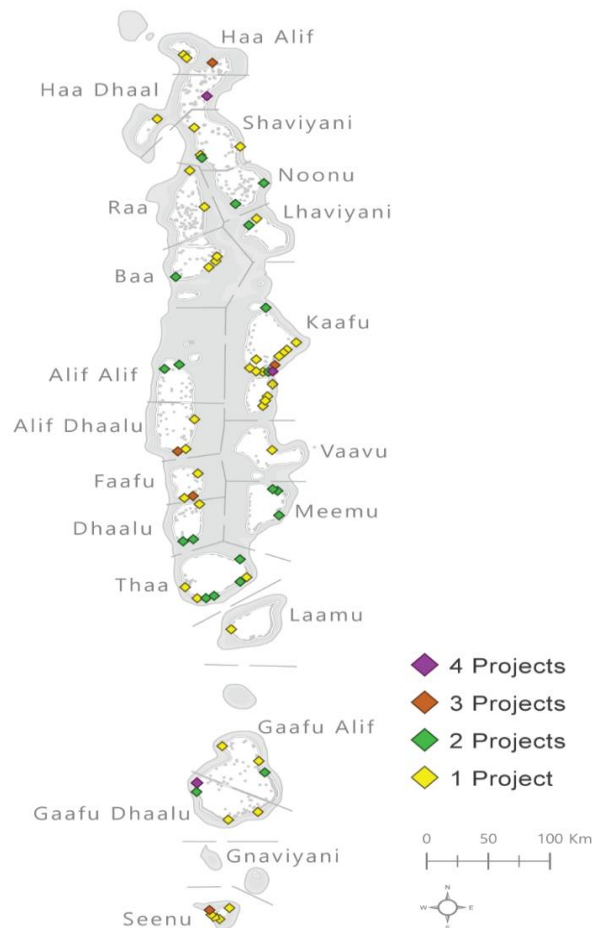


Figure 1 Project Count Map. (Source: Figure by Authors (2025))

At least 4,198 hectares of land were reclaimed during the study period, acknowledging that this is a conservative estimate due to missing area data for several projects. The Central Region accounts for approximately 71 percent of total reclaimed land, with Kaafu Atoll alone representing more than half of the national total (Figure 2).

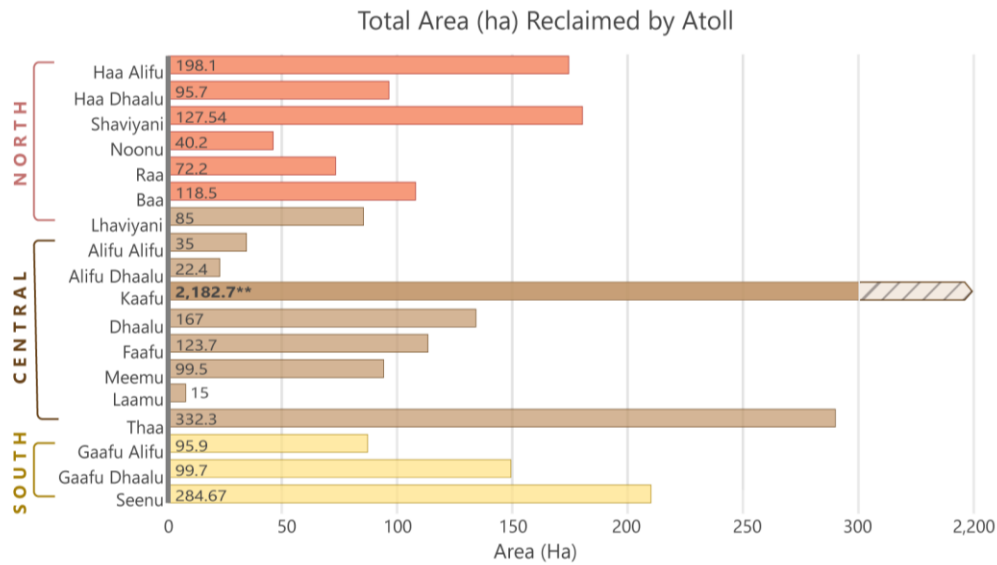


Figure 2 Total reclaimed area across Atolls. (Source: Figure by Authors (2025))

### 4.2 Temporal Trends

Reclamation activity was limited prior to 2010, followed by a sustained increase. A pronounced peak occurred in 2023, when 25 projects were initiated nationwide, coinciding with heightened infrastructure investment and political transition [2] (Figure 3).

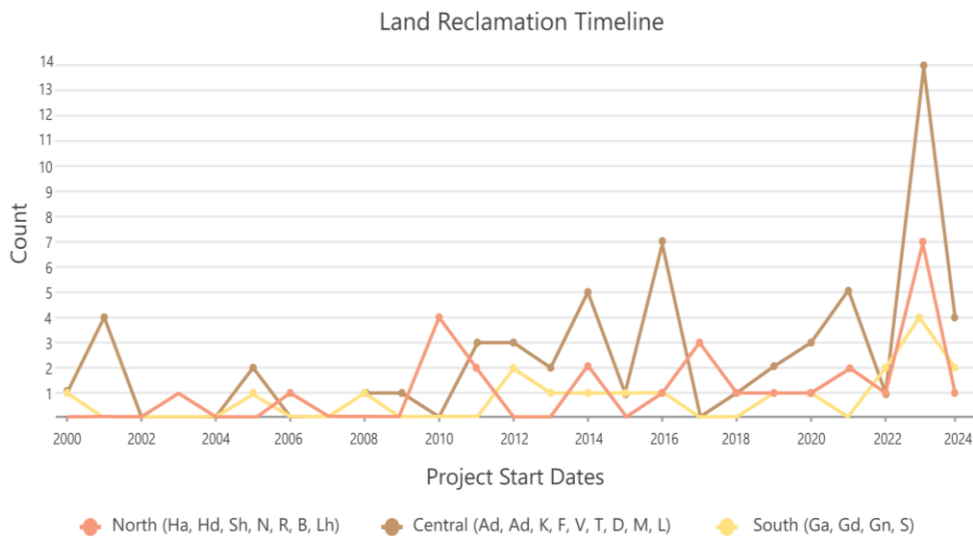


Figure 3 Timeline of projects across regions. (Source: Figure by Authors (2025))

### 4.3 Reclamation Typologies

Four reclamation typologies were identified: extensions of natural islands, extensions of artificial islands, creation of new artificial islands, and artificial picnic islands (Figure 4). Extensions of natural islands dominate numerically, accounting for approximately 90 percent of projects. However, artificial islands account for roughly 40 percent of total reclaimed land due to their substantially larger scale.



Figure 4 (Top left) MTCC. Extension (Natural Island), K. Huraa. Adapted from: PSM News (2020). (Top right) Ministry of Construction, Housing & Infrastructure. Artificial Island, K. Gulhi Falhu. Adapted from: Waheed (2024). (Bottom left) Housing Development Corporation. Extension (Artificial Island), K. Hulhumalé. Adapted from: Corporate Maldives (2022). (Bottom right) Avas. Artificial Picnic Island, K. Kudagiri Picnic Island. Adapted from: Avas (2022).

#### 4.4 Intended Purpose

Most projects were justified under Social and Economic Development, followed by airport and harbour development (Figure 5). Shore protection frequently appeared as a secondary objective, particularly in larger projects. Multiple overlapping purposes were common, highlighting the complex motivations underpinning reclamation decisions.

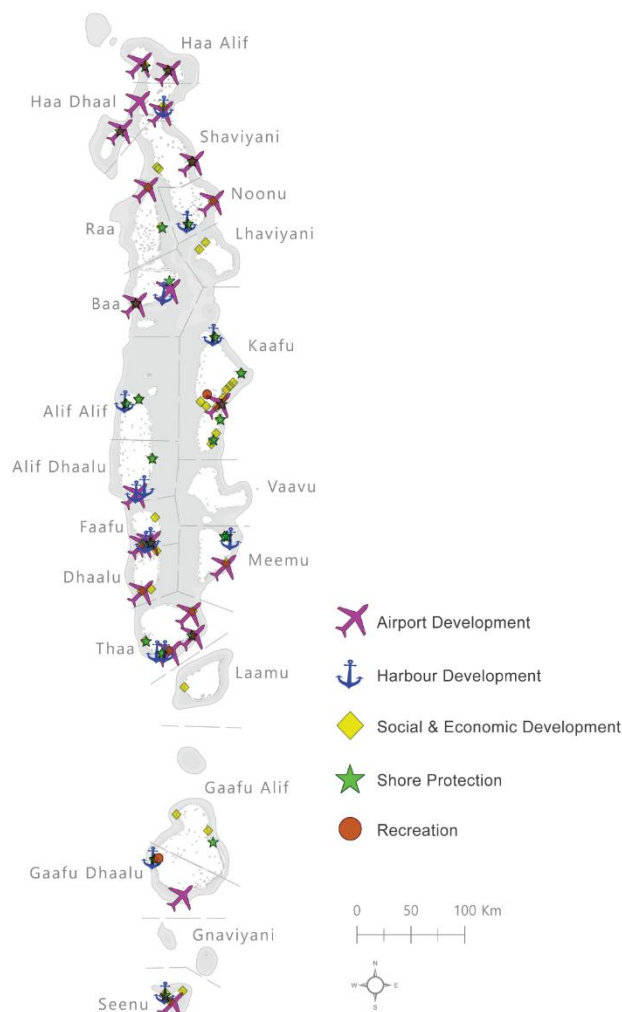


Figure 5 Project Intended Purpose distribution across Maldivian inhabited islands. (Source: Figure by Authors (2025))

### 5. DISCUSSION

The scale of land reclamation across inhabited Maldivian islands is exceptional in global terms. When compared with global datasets, the total reclaimed area exceeds that recorded across entire continents since 2000 [1]. This underscores the intensity of human-driven coastal transformation in the Maldives.

The findings reveal several systemic issues. First, the duplication of major infrastructure, particularly airports within single atolls, suggests weak strategic coordination and limited consideration of regional efficiency. Similar concerns have been raised in relation to airport development on reclaimed land in ecologically sensitive areas [24, 25].

Second, reclamation allocation often fails to align with demographic trends. Despite continued migration toward the Greater Malé region [13], substantial reclamation has occurred in smaller islands with limited population growth. This pattern reflects a tension between centralized and decentralized development objectives articulated in earlier national policies [7].

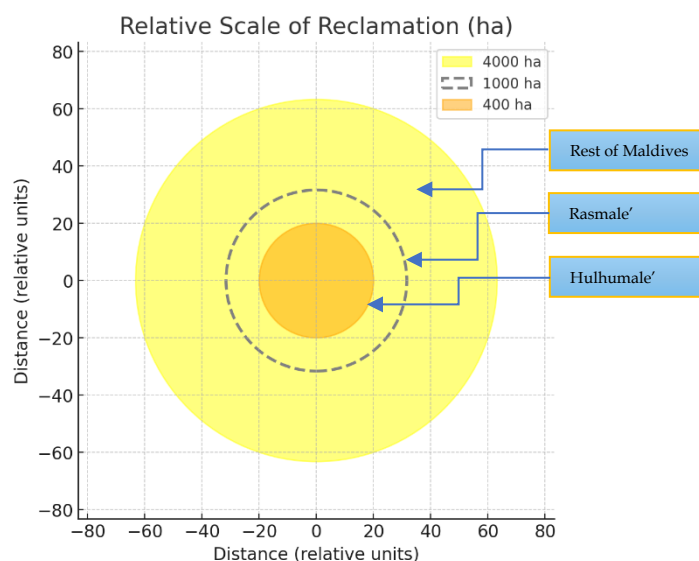


Figure 6 Relative Scale. (Source: Figure by authors (2025))

Third, the surge in reclamation following the transition to multi-party governance raises questions regarding political incentives, electoral cycles, and development decision-making in the absence of binding national planning frameworks [26]. The combination of decentralized island-level reclamation and large-scale artificial island development reflects a fragmented development logic.

From an environmental perspective, widespread extension of natural islands using standardized engineering approaches risks undermining island resilience by disrupting sediment dynamics and increasing exposure to sea-level rise and flooding [3, 4].

## 6. CONCLUSION

This study provides the first comprehensive national assessment of land reclamation across inhabited islands in the Maldives. By documenting 109 projects and more than 4,000 hectares reclaimed between 2000 and 2024, it demonstrates that land reclamation has become one of the most significant drivers of spatial transformation in the country.

The findings highlight fragmented development patterns, infrastructure duplication, demographic misalignment, and governance gaps that raise serious concerns about the long-term sustainability of current reclamation practices. While land reclamation remains a powerful tool for addressing land scarcity, its continued use without coherent planning, robust regulation, and environmental sensitivity risks exacerbating vulnerability rather than reducing it.

The proposed national development masterplan announced in 2024 offers a critical opportunity to reposition land reclamation within a strategic, evidence-based framework [27]. Whether this opportunity is realized will shape the future trajectory of development, resilience, and environmental stewardship in the Maldives.

**Conflicts of Interest:** The authors declare no conflict of interest.

**Data Availability Statement:** The data supporting the findings of this study are available from the author upon reasonable request.

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