

Community-Based Rubble & Marine Plastic Recovery for Gaza

1. Executive Summary

This document presents a comprehensive, low-technology, community-based recovery program designed specifically for the Gaza Strip under conditions of prolonged conflict, extreme water scarcity, limited energy access, and absence of functional heavy industry.

The project integrates two critical waste streams—**war rubble** and **marine plastic waste**—into a unified early recovery framework that simultaneously addresses **shelter reconstruction, food security, livelihood creation, and environmental remediation**.

Rather than applying conventional industrial recycling or reconstruction models, which are infeasible in Gaza, this initiative proposes a **decentralized hub-based system** that converts war debris into **low-cost construction materials** and plastic waste into **food-linked, in-kind economic value**, avoiding cash-based vulnerabilities.

The program is designed for immediate deployment (1–3 years) with scalability up to five years if crisis conditions persist, and aligns with UNDP’s mandates on Early Recovery, Community Resilience, and Crisis-Adapted Circular Economy.

2. Context and Situation Analysis

The Gaza Strip has experienced repeated cycles of destruction resulting in the accumulation of millions of tons of war rubble, severely constraining mobility, access to services, and reconstruction efforts. At the same time, the collapse of solid waste management systems and damage to wastewater infrastructure have

led to a sharp increase in **marine plastic pollution** along the Mediterranean coastline.

Key contextual constraints include:

- Near-total absence of freshwater for industrial or construction washing processes
- Severe limitations on fuel and electricity availability
- No functional cement kilns or heavy recycling industry within Gaza
- High unemployment and erosion of household purchasing power
- High inflation risk and inefficiency in cash-based aid mechanisms

In this context, rubble and plastic waste represent not only environmental hazards, but **strategic recovery assets** if managed through appropriate, crisis-adapted systems.

3. Problem Definition

The crisis in Gaza is characterized by interconnected problems:

1. **War rubble** obstructs rebuilding while imported construction materials are scarce or unaffordable
2. **Marine plastic waste** threatens coastal ecosystems, public health, and fisheries
3. **Unemployment** and aid dependency undermine dignity and resilience
4. **Cash assistance** is vulnerable to inflation, diversion, and market collapse

There is a critical need for a **non-cash, low-resource, community-driven recovery model** that links environmental cleanup directly to shelter and food security outcomes.

4. Overall Goal and Objectives

Overall Goal

To enhance early recovery, food security, and community resilience in Gaza through decentralized recovery hubs that transform war rubble and marine plastic waste into locally usable materials and in-kind value.

Specific Objectives

- Process war rubble into low-cost, non-structural construction materials for local reconstruction
 - Reduce marine plastic pollution through community-based collection and preparation
 - Generate dignified, food-linked livelihoods for conflict-affected households
 - Establish scalable recovery hubs operable under water, energy, and mobility constraints
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5. Project Design Overview

The project is structured around **Community Recovery Hubs (CRHs)**, each serving a defined cluster of neighborhoods and employing **20 local workers**.

Each hub integrates:

- Rubble triage and dry crushing
- Low-water block and aggregate production
- Plastic sorting and baling
- Transparent, food-based incentive distribution

Internal transport relies on **cargo tricycles**, ensuring resilience under fuel shortages and damaged road networks.

6. Component A: War Rubble Processing and Low-Cost Construction Materials

6.1 Rubble Typology

Rubble in Gaza is assumed to be mixed war debris, including concrete, masonry, metals, and hazardous materials. No assumptions are made regarding homogeneity.

6.2 Operational Process

- Manual on-site triage separates metals, reusable components, crushable debris, and hazardous waste
- Hazardous materials (e.g. asbestos, medical waste) are **excluded from processing** and disposed of via controlled burial
- Crushable material is processed using **dry, low-capacity mobile crushers**
- Aggregates are graded mechanically without washing
- Output is directed to **low-cost, non-structural blocks**, pavements, and infill materials

Sea sand is explicitly excluded due to chloride contamination and lack of freshwater for washing.

6.3 Outputs

Per hub (average):

- 8–12 tons of recycled aggregate per day
- 600–900 low-cost blocks per day
- Immediate neighborhood-level utilization

7. Component B: Marine Plastic Recovery and Value Preparation

7.1 Plastic Scope

The project targets mixed marine plastics with priority on:

- PET bottles

- HDPE containers

No attempt is made to perform mechanical recycling inside Gaza.

7.2 Processing Method

- Dry manual sorting into three categories: PET, HDPE, Mixed
- Dry shaking and solar drying to remove sand and moisture
- Manual or small hydraulic baling
- Aggregation for regional transfer

No water washing, shredding, or thermal processing is conducted.

8. Food-Based Value Exchange Mechanism

Recovered plastics are converted into **food-equivalent value units** rather than cash.

Example benchmark (adjustable by market conditions):

- 100 kg baled PET \approx food support for 5–7 families for one week

Food is distributed via vouchers or parcels in coordination with food security partners (e.g. WFP-aligned systems).

This mechanism:

- Protects household purchasing power
 - Reduces inflationary risk
 - Enhances transparency and dignity
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9. Community Incentive System

- Clear three-category plastic system understood by the public
- Public display boards showing daily conversion rates

- Higher incentives for PET and HDPE
 - Mixed plastics accepted at lower value to discourage dumping
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10. Gender, Protection, and Social Inclusion

- Inclusive employment of men and women
 - Safe working conditions and PPE provision
 - No child labor
 - Transparent entitlements and grievance mechanisms
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11. Environmental and Social Safeguards

- Controlled burial of hazardous debris
 - Dust mitigation via PPE and localized dampening
 - No open burning or uncontrolled dumping
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12. Implementation Arrangements

- Lead Agency: UNDP
 - Technical collaboration: UN-Habitat (shelter), WFP (food linkage)
 - Local NGOs manage daily hub operations
 - Community committees oversee transparency
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13. Monitoring, Evaluation, and Reporting

- Daily production logs per hub
- Monthly aggregation reports

- Quarterly outcome monitoring
 - UNDP-aligned indicators for recovery, livelihoods, and environment
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14. Risk Analysis and Mitigation

Key risks include security disruptions, hazardous debris exposure, and governance challenges. These are mitigated through decentralization, in-kind assistance, community oversight, and strict exclusion protocols.

15. Sustainability and Exit Strategy

- Skills and equipment remain within communities
 - Hubs can transition to permanent workshops or municipal assets
 - Plastic value chains can evolve into commercial systems post-crisis
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16. Strategic Value for UNDP

This project bridges humanitarian response and early recovery, offering a **replicable crisis-adapted circular economy model** suitable for Gaza and comparable conflict-affected contexts.
