

## Undersea Aid Module (UAM)

**Tethered undersea aid caches surface on command after disasters, bypassing damaged ports/airfields to deliver rapid shoreline relief and cut preventable casualties.**

Natural disasters cause three times more casualties on islands compared to continental regions due to their isolation, providing limited options and delays for delivery of critical aid relief. Island access is limited to two modes of transportation- maritime and air. These limitations decrease the volume and increase the waiting time of aid delivery resulting in avoidable deaths, untreated injuries, and health insecurity. Furthermore, over-reliance on air-based delivery on islands has been shown to be ineffective due to high expense, low accuracy, introduction of injury risk, unusable infrastructure, and unfavorable weather conditions during natural disasters. Therefore, there is a need to develop more efficient modes of aid delivery to limit the impact of disasters for island nations. Researchers at Purdue University have proposed a new undersea aid cache network for disaster relief. The undersea aid module (UAM) comprises a roughly 2 cubic meter container to hold disaster relief supplies capable of enduring water pressure of approximately 330 psi at a depth of 200 meters. In disaster situations, the submerged UAM is tethered to anchors that are programmed to release on command, allowing the module to surface and wash to shore for immediate aid relief. The researchers identified multiple island nations suitable for UAM deployment, namely: Indonesia, Papua New Guinea, Taiwan, Philippines, Sri Lanka, and Haiti.

### Technology Validation:

UAM deployment was validated with a simulation model to evaluate its effectiveness in reducing deaths and injuries during disasters. The simulation found statistically significant reductions in dead and injured when UAMs were deployed at a rate of 76 UAMs per 5000 people, a failure rate of under 15%, and a per-UAM capacity of supplying 310 people for a day. The simulation results proved that UAM deployment could help reduce the number of deaths and injuries significantly, i.e., prevent most or all of the 600 average supply-related deaths and serious injuries in disaster situations.

### Technology ID

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### Category

Aerospace & National  
Security/Defense, Electronics, &  
Surveillance Technologies  
GreenTech/Carbon Management  
Computing/Networking &  
Connectivity

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### View online



**Advantages:**

- Fast access to aid
- Safer access to aid without heavy reliance on air
- Could reduce the number of deaths and injuries
- More sustainable mode of aid

**Applications:**

- Aid supply for disaster relief
- Secure storage for contingency planning (military and government)

**Publications:**

-Knudsen, P. L., & Johnson, M. (2023). An Ocean Apart: Island Disaster Response Logistics. In "Defense and Security Research Symposium of the Purdue Military Research Institute."  
<https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1000&context=pmri#page=42>

-Knudsen, P.L. (2024). Sea-based Disaster Response Logistics. Purdue University Graduate School. Thesis.  
<https://doi.org/10.25394/PGS.26169178.v1>

-Sea-Based Disaster Response Logistics  
(<https://storymaps.arcgis.com/stories/a3cf9c976e154b6b9c074fef3e3feb64>)

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**Intellectual Property:**

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