



# ARISE Case Studies in Disaster Risk Management



## Humus technology for preventive and post-disaster land conservation in disaster areas

Due to abundance of precipitous slopes, Japan historically has faced the risks of landslides and slope related disasters. In the present, developed roads and residences along slopes face latent threat to public transportation, living environments, and human lives. The countermeasures to mitigate possible slope disasters need prompt implementation, but face increasing demands for efficiency under financial limitations. Artificially manufactured humus materials, a humic substance that forms in soil after plant matter decays in nature, are beneficial to managing slopes and preventing disasters in public infrastructure projects. Recently, humus technology was used in national roadside slope stabilization works in Kagoshima prefecture and Kyoto prefecture. Furthermore, this technology was used to improve the water environment of enclosed coastal seas in Mie prefecture under the Environmental Technology Verification program of Ministry of the Environment. To date, we have utilized humus material to accelerate plant growth on slopes for landslide prevention; brown field desalination; recovery of tsunami-flooded agricultural fields; reforestation after fires; recovery of degraded forests and closed water systems; contributing to sustainable development; and overall increase in resilience in Japan and Asia.

RISK	ACTION	IMPACT	OUTPUT
Landslide risks are on the rise in countries where climate change increases weather related disaster risk. At the same time, urbanization and other factors bring residences, infrastructure, lives and livelihoods close to exposed slopes. Slopes along roads and developed areas can be covered in concrete, but concrete degrades over time and maintenance costs can be high. A greening method is preferable but the speed of development as well as density of plant coverage may vary under natural conditions.	Humus materials were effective for use in roadside slope stabilization, applied to encourage vegetation growth and speedy formation of roots that anchor the slope. Our company has developed a patented process that artificially manufactures two of the three main beneficial compounds in humus (humin and fulvic acid) from woodchips in a quantity suitable for use in public infrastructure projects.	The greening method with humus material was successful to stabilize slopes with growth of roots. Humus material promoted vegetation growth and prevented erosion on the surfaces of slopes. This method was cost-effective compared to the conventional method that slopes were covered in concrete. The availability of humus materials adds an environmentally friendly, effective, and inexpensive option for slope stabilization in infrastructure projects.	The application of humus materials goes beyond slope management. Humus material can be used for accelerating plant growth after forest fires, desalinating salt accumulated fields for farming, and increasing agricultural yield. Its potential is even greater. Pine needles from a famous tourist attraction in Japan have been used as input material (replacing woodchips) to produce humus material for cosmetics. The cosmetics are marketed to tourists. The process recycles waste as well as partially absorbing cost for site maintenance.



Stabilization of slopes against landslides using plant growth in Kyoto, Japan



Desalination and agricultural yield improvement in Jilin, China



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### Lessons Learned

Research and technological breakthroughs can lead to unexpected applications and business growth. R&D originally aimed to solve a specific issue (stabilization of landslide-prone slopes) has been proven to have many further applications for resilience building and sustainable development, improved the scope of business, and increased corporate visibility.

### BUSINESS CASE

Our company principle has been to pursue technological innovation in the area of water and soil science for making a better world. Use of the humus material fits our long term goals.

Pursuing our principle led us to carefully consider the question of source materials and process (our product is made from domestically sourced woodchips), and it led us to find its value added in terms of sustainability and environmental conservation. These findings will help us to capture new business opportunities in the area of agriculture and food production in the near future.

### REPLICATION OPPORTUNITIES

The humus material has been successfully used outside Japan. This is chiefly because, unlike humus materials produced through composting, the manufacturing process does not involve a fermentation process and thus can be exported without any limitations. Proven uses of humus material include stabilization of slopes, accelerating the recovery of plant growth on land (forests, grassland, and agricultural land) and water. These environmental solutions of humus material will contribute to raising resilience toward climate change and related disasters. Our patented process can be adapted to different starter materials. We are open proposals from potential partners and pilot projects.

### How does the project support the implementation of the Sendai Framework targets?

1	<i>Reduce disaster mortality by 2030</i>		This project/product directly addresses an element in public infrastructure management – stabilization of exposed slopes. It offers a green solution that is maintenance-friendly over the long term. Slope stabilization, environmental recovery, etc. would contribute to increased resilience, especially against weather hazards, and indirectly contribute to reducing economic loss.
2	<i>Reduce number of affected people by 2030</i>		
3	<i>Reduce economic loss by 2030</i>	X	
4	<i>Reduce infrastructure damage and disruption of services by 2030</i>	X	
5	<i>Increase countries with DRR national/ local strategies by 2020</i>		
6	<i>Enhance international cooperation to developing countries</i>		
7	<i>Increase the availability of and access to EWS* and DR information to people by 2030</i>		

### How does the project contribute to the ARISE Themes?

1	<i>Disaster Risk Management Strategies</i>	X	Slope stabilization, infrastructure maintenance and management, and environmental recovery and increasing sustainability are all integral elements of urban risk reduction and resilience, as well as DRM strategies.
2	<i>Investment metrics</i>		
3	<i>Benchmarking and Standards</i>		
4	<i>Education and Training</i>		
5	<i>Legal and Regulatory</i>		
6	<i>Urban Risk Reduction and Resilience</i>	X	
7	<i>Insurance</i>		

### For More Information



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