

## AWARD CATEGORY: Environment

### APPLICANT CONTACT INFORMATION

**Name:** Katherine Kirbo  
**Title:** Executive Director  
**Organization:** Reef Ball Foundation  
**Project Name:** Reef Ball Foundation  
**Address:** 603 River Overlook Rd  
**City:** Woodstock  
**State:** GA  
**Postal Code:** 30188  
**Country:** United States  
**Phone:** 770-752-0202  
**Fax:** 770-360-1328  
**Email:** [kathy@reefball.com](mailto:kathy@reefball.com)  
**Url:** <http://www.reefball.org/>  
**Applicant Type:** Not-for-Profit Organization

**Would you be willing to have your project included in future University research efforts? Yes**

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### APPLICATION QUESTIONS

**Project Profile:** *Please provide a 75 word profile of your technology as you would like it to appear on our website.*

The Reef Ball Foundation is an international environmental non-profit group. Our mission is to help restore our world's ocean ecosystems and to emphasize and protect our natural reef systems through preservation, Reef Ball technology, innovative public education projects and community involvement. We work with governments, businesses, schools, research institutes, private individuals and community organizations. The Reef Ball Foundation has conducted projects in over 50 countries worldwide with partner diversity ranging from the Boy Scouts of America's High Adventure program in Islamorada, Florida to the government of Sarawak's marine sanctuary for sea turtles in Malaysia, to Instituto Ecolplan's habitat restoration project in Brazil, and most recently a Tsunami restoration project in Thailand. Reef Ball has over 3,500 projects worldwide and has received extensive press coverage on CNN, ENN, the Discovery Channel, National Geographic, Weekly Reader, Popular Science, The Wall Street Journal, Mother Jones, Wired, Scientific American, various diving publications and in numerous newspapers throughout the world. [www.reefball.org](http://www.reefball.org)

**Problem Identification:**

*What serious problem or challenge with broad significance does your use of technology address? Explain your context and the existing conditions that you are trying to improve or rectify.*

The Reef Ball Foundation is addressing the decline of coral reef systems and the ocean ecosystems. Coral reefs are in decline all over the globe. Although they are located in the tropics their benefits are far reaching all across the world. The increase of human pressures on the reef systems over the last 50 years or so is putting a tremendous weight on the health of coral reefs. Dynamite fishing, run-off, pollution, global warming, overfishing are just a few of these pressures. Scientists report that 11 % of the world's coral reefs have been lost and another 16% were damaged during 1998 with El Nino. Scientist estimate that another 32% of coral reefs will be lost in the next 30 years if we continue our present rate of destruction. Coral reefs are important because they provide a home for much of our marine environment and protect our coastlines. The severe decline of our coral reef systems will have disastrous consequences around the world. Without reefs, marine life will be threatened and we will have severe losses in biodiversity of species and in turn our fishing systems will be bankrupt. With the world overpopulation problems growing and with our fishing systems broke, this will make for a severe challenge in finding a way to feed the planet. Also, coral reefs are an important factor to the economy and tourism around the world. Coral reefs are a key component to our fisheries and tourism industries which many countries base their entire economy. Coral reefs also protect coastlines and the recent studies from the Boxing Day tsunami in Asia showed areas that had healthier reef systems had fewer losses of lives. Also, coral reefs are like the rainforest of the ocean and with their great plant and animal biodiversity many medicinal uses have been found within the reefs. Numerous useful drugs have been derived from species found in the reefs, such as a species of sponge that is used in cancer treatment, AZT. Other treatments derived from coral reefs are used for leukemia, ulcers, cardiovascular diseases, skin cancer, and sun tan lotion ingredients. Also, coral itself has been used for skin grafting materials. Coral reefs should be preserved, so that we may continue to do drug research on potential cures for diseases. Just like the rain forests, the coral reefs of the world may yield many new substances that can be used to better the human condition. Save reefs and the life they support so those discoveries can be made before they disappear. Because coral reefs play a vital role in our world and they have been severely threatened, The Reef Ball Foundation was formed to help preserve and restore coral reefs and our ocean ecosystems and provide unique educational projects and programs to raise the awareness of their importance.

**Description of Technology Application:**

*Fully describe the technology application. What technology is being used? How is it being used? Who is responsible? Who is benefiting? What processes or systems are in place to deliver this technology?*

The Reef Ball Foundation stresses the importance of preserving our reef systems and preaches that it is wiser to take good care of a reef than to rebuild one. The loss of our natural systems, coupled with increased use, COMPELS US TO DO EVERYTHING WE CAN TO SAVE NATURAL REEFS. Even so, the natural reefs cannot rebuild themselves fast enough to meet human demands. A Reef Ball was designed to help

restore reefs. Reef Ball is a Designed Artificial Reef used to restore ailing coral reefs, marine habitat restoration, fishing reefs, diving reefs, beach protection, freshwater applications, mitigation, oyster reefs, research and educational applications, etc. A Reef Ball is an artificial module made of a special concrete aggregates that mimics the appearance and function of the natural coral reef. Reef Balls are hollow with openings and channels which create an ideal living environment for a variety of marine species. The concrete, with pH similar to sea water, assures compatibility with marine environments and enhance its attractiveness to colonizing invertebrates and plants. Reef Balls vary in composition, thickness, and size. Just as natural reefs vary, each module is different for various goals and applications. Varying surface pattern and textures also enhance marine life settlement. Reef Balls are extremely stable and were designed to withstand movement and destruction during storms. Reef Balls have remained stable in the highest rated storms including the tsunami in Asia. Natural reefs vary in size, shape and in the networks of holes through them. Artificial reefs function better when they mimic nature. The number, sizes and placements of holes can be altered for each individual unit to create a variety similar to that of a natural reef. The hollow interior space provides perfect housing and shelter for an abundant variety of marine life. Additionally, advanced coral transplantation techniques allow the addition of coral plugs to the reef ball's surface to enable the quick initiation of hard and soft coral growth and allow coral damaged by storms, dredging, etc. to be saved and propagated. Aside from coral and marine habitat restoration, Reef Balls are also used to oyster recovery in bays and estuaries, to protect beaches and are used for barrier reefs and breakwaters. This is an environmental friendly approach to beach restoration. Detailed technical information about the use and technology of Reef Balls can be found on our website at [www.reefball.org](http://www.reefball.org). The Reef Ball Foundation works with governments, businesses, schools, research institutes, private individuals and communication organizations. The Reef Ball Foundation has conducted projects in over 50 countries worldwide with partner diversity ranging from the Boy Scouts of America's High Adventure program in Islamorada, Florida from the government of Sarawak's marine sanctuary for sea turtles in Malaysia, to Instituto Ecoplan's habitat restoration project in Brazil and Tsunami restoration in Thailand. The foundation has conducted on over 3500 projects worldwide. The foundation's grant program, Reefs Around the World is a popular way to create a reef working with organizations providing Reef Ball molds or propagation/transplanting kits and training or an educational program. To qualify for the program, organizations must meet requirements and provide monitoring results for three years. We post monitoring and research studies on our website from all our projects.

**Explanation of Leading Edge or Breakthrough Technology:**

*Why do you think that your use of technology is worthy of recognition? Describe if it is a new technology or a new use of an existing technology. How can it be distinguished from existing uses? Explain how it surpasses previous or current solutions.*

At the least, the work of the Reef Ball Foundation is worthy of recognition because its many projects bring to light the importance of our ocean ecosystems and why they are worth protecting and saving. Though a Reef Ball looks low tech, it is high tech in its design and an economical solution. We have created a way to construct them where

they can easily be made and deployed in developing countries. We intentionally use construction tools and products they can be found anywhere and volunteers can easily learn the techniques. They also can be deployed without costly barges as they can be easily towed out and placed by divers through our inflatable buoy system. Artificial reefs originally got a bad name because it was mostly trash (materials of opportunity) being dumped in the oceans and rivers and they called it a reef. Like cars, refrigerators, tires, etc. This was more of a convenient way of dumping trash or a company getting rid of waste like tires. Tires became an example of this and tires were used as artificial reefs throughout the states. Eventually the states spent millions of dollars cleaning up tire fragments that washed up on beaches because they do not make good reefs and break apart. All of these items were never designed for restoring a reef or marine habitats. The materials can never be cleaned up well enough to not include toxic materials or they may shift during storms tearing up the ocean floor as they shift. Ships are a good example of this. Reef Balls were designed to be stable and not shift in storms and have survived the highest rated storms including hurricanes and the latest tsunami. Reef Balls materials are designed to be compatible with the ocean environment and are of a similar pH as salt water and designed to promote biodiversity.

**Evidence of Contribution**

*How do you know that your application of technology is making a contribution?*

The Reef Ball Foundation requires through our grant program that all projects send in monitorings for three years and many of the projects are associated with universities or research institutes. We list many of these monitorings and studies on our website. Our website also promotes the exchange of information on coral reef studies. Most of our projects are ongoing and we keep up to date with monitorings. We have found that the projects are much more successful when there is community involvement in the project and we encourage working on partnerships within the community. This helps raise awareness of the project and if for example if it is a government project and the government changes guard the project could be forgotten, but if we have community partners there is a much greater chance the project will be ongoing. Our educational endeavors have twice won a national award for environmental excellence for the Sea World Bush Garden's Environmental education awards.

**Presentation of Measurable Results:**

*Describe the method(s) you are using to measure your results. How are you reporting your results and to whom? To whom are you accountable?*

Our grant program, Reefs Around the World, requires that projects send in monitorings for three years and most of these projects are associated with a research team or university or school and are generally accepted methods for monitorings of marine life. We post these findings on our website. We also have quality control standards that projects must maintain. Most governments have regulations we must meet for projects and we must get permits for projects for various departments, such as environmental resources, Army Core of Engineers, Fish and Wildlife, etc. Most governments also do studies of the projects and findings are available to us. Projects would not be allowed to continue or expand if results were favorable. We typically go to conferences to hear reports on our projects by universities and research institutes and the reports are generally sent to us and posted.

<b>Description of Potential Negative or Unintended Consequences</b>	<i>Describe any outcomes that may not be beneficial that you have considered. Who might consider your application problematic and why?</i>
<b>Discussion of Replication Potential:</b>	<p>Perhaps some naturalists would object to restoring a reef as you should not interfere with Mother Nature as it is not natural. I believe in this case, if the human condition has helped to destroy it and there was a chance to revive it and help the environment and the human condition, we must do everything we can. Should we not give a liver transplant to someone who is ill and will have a meaningful life with the transplant just because it is not natural to have a transplant.</p>
<b>Discussion of Others Contribution:</b>	<p><i>Describe how your work might be a model for others to emulate. Could this application be put to use in other places or contexts?</i></p> <p>I think our approach to doing projects as a business model could be vary helpful to other organizations working on similar projects for public benefit. The internet was a vital part of our success gaining volunteers and workers all around the globe. Also, a comparative approach could be a useful tool in trying to find a restorative measure for an environmental problem or medical problems, etc. Our initial group was not just scientists, but from all different professions that gave us a wide range of backgrounds for development. For example, artists wanted a reef ball to mimic the natural look of a reef, etc. This helped to develop our technology. Though they were original thought off to only restore coral, it expanded to breakwaters, beach protection, oyster recovery that helps forge out the water in bays and estuaries, coral transplants, mangroves, etc.</p> <p><i>Does this work draw upon the intellectual property or substantive contributions of others that should be acknowledged and appropriately reference?</i></p> <p>The initial idea for the Reef Ball was by the Reef Ball Foundation's president, Todd Barber and his father. Todd Barber holds the patent for the design. After having the initial idea, he enlisted the help of his college diving friends to implement the idea and later scientists and concrete experts,etc. From this hobby by diving friends, the foundation was born. The foundation's success was developed through the work of the foundation's board/staff who are mostly the foundation's original volunteers and from that its success grew from the work of numerous dedicated world-wide volunteers. The key component to our success has been magically finding wonderful volunteers all across the world who deeply care about the environment and want to make a difference.</p>

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## REFERENCES

### Letter of Reference 1

<b>Referer Name</b>	Sir Nicholas Nuttall
<b>Referer Org.</b>	BREEF Bahmas Reef Enviromental Education Foundation
<b>Referer Title</b>	Founder
<b>Referer Phone</b>	242-362-6477
<b>Referer Email</b>	breef@coralwave.com

**Complete?**

Yes

Thursday, 05 May 2005 I have known and worked directly with Reefballs for over five years. This organisation bought two sets of Reefball moulds and donated them to the Bahamian Field station on San Salvador, Bahamas, (now the Don Gerace Field Station) and to the Island School at Powell Point, Cape Eleuthera. I have made and launched a Reefball myself and have observed their success in attracting both fish and young corals. By choosing an attractive natural shape for their product, that of a brain coral, Reefballs have benefited from an aeons old design that looks right for the job. From the start this attracted funds and inspired people who wanted to restore a reef or to build a natural breakwater. This common sense approach lies at the heart of their remarkable success around the world. A field of Reefballs of various sizes acts almost like a real reef in successfully dissipating wave energy. At first sight, a coral reef looks solid until closer inspection reveals that at every scale it is full of holes in which the fish can breed, shelter, or lie in ambush. Reefballs copied this structure by making their product hollow. This not only gives shelter like a reef, it makes the balls easy to cast, saves material, makes them easy to handle and float into position and keeps them stable once they are in position. By locating their production yards close to ready mix facilities whenever possible, Reefballs get a supply of material that the manufacturer would otherwise have to dump. This is a good example of waste management, recycling and energy conservation.

**Reference**

Reefballs have designed an additive that neutralises the concrete making it more like a natural limestone substrate to attract the young coral planula. They are an art form, and far superior as artificial reefs than industrial discards such as cars, planes or warships. I support the award being given to the Reefball organisation as suggested and not to one individual. I know both Kathy Kirbo and Todd Barber. It is typical that they would want the organisation they inspired to be recognised rather than themselves as individuals. It works around the world and it would be hard to single out someone individually. I have been working in marine conservation ever since I retired twelve years ago, and most admire those organisations whose output a sentient fish or coral would “recognise.” Some like ourselves get the laws changed so that fish are left in peace at breeding time. Reefballs provide fish with shelter year round and provide a base for coral growth to repair reefs damaged by nature or the works of man. They also benefit those fishermen who make their living from the coral seas and can provide a self renewing shelter for their homes and boats that are so often in peril from the full force of the open sea. As they are “at work” around the world in countless locations, I think that Reefballs would win the coral reef fish vote for your award over any other organisation for the direct benefit they provide.

Nicholas Nuttall

Sir Nicholas Nuttall Founder and Chairman Bahamas Reef Environment Educational foundation

**Letter of Reference 2****Referer Name**

William Izlar

**Referer Org.** Retired  
**Referer Title** Advisor  
**Referer Phone** 404-873-0284, 404-307-9894  
**Referer Email** whizlar@aol.com  
**Complete?** Yes

This letter of recommendation is written and sent to you to support the application of the Reef Ball Foundation to receive a Tech Museum Award in the Environment category.

I have been intimately involved with the Reef Ball Foundation for over 10 years. I am the Chairman of a private foundation, The Kuhrt Foundation – in no way related to the Reef Ball Foundation, its officers, or its members – located in Atlanta, Georgia that has helped sponsor the organization from its inception.

The Kuhrt Foundation was the first official funder of the Reef Ball Foundation, and it is our only direct support for environmental projects. Through the years, The Reef Ball Foundation has been extremely diligent in keeping us apprised of its projects and works by frequent reports, letters, notes and personal visits. In turn, The Kuhrt Foundation has been gratified by the wonderful environmental work done by the Reef Ball Foundation during the time of our assistance to it.

Our contact with the Foundation has been principally with Kathy Kirbo, Executive Director who has through the years manifested an inspirational selflessness in promoting the reef ball and collateral technology in helping to solve environmental problems literally around the world.

## Reference

Kathy on a small budget and on a tiny income has given an incredible amount of herself to the Foundation and its work.

I think this organization, Reef Ball Foundation, is particularly worthy of recognition. From its inception it has worked tirelessly to correct ecological damage and destruction. Kathy Kirbo and Todd Barber, President, travel the world and work hands-on in areas in need of reef and shoreline restoration.

The Reef Ball Foundation has conducted projects in 50 countries including work done in East Asia, North, South and Central America and also in the Maldives off of the Indian sub-continent.

At the present Kathy Kirbo and Todd Barber are working closely with the government of Thailand in the Phuket area to rebuild parts of the shoreline destroyed by the recent Tsunami. Both of them have visited and worked on site in the Phuket area and have organized another volunteer effort there and will travel, this fall, to Sri Lanka to work on Tsunami damage. They are doing this in the face of a number of other challenging projects in the Caribbean area that also need immediate attention.

I feel that it is particularly appropriate that the Reef Ball Foundation itself be recognized.

I am not aware of any intellectual property or work by others—except Kathy Kirbo and Todd Barber—that should be recognized in conjunction with this nomination.

I am confident that the technological contribution of the Reef Ball Foundation is the best in the field. Frankly, I know of no other institution doing such in depth and geographically wide ranging work in reef and shoreline restoration. This ecologically important work is benefiting humanity around the world.

I can assure you that if Kathy Kirbo, Todd Barber and or the Foundation receive your award, the monies will be used for reef and shoreline environmental work.

Please contact me at any time regarding the work of the Reef Ball Foundation. Our Foundation could not be more pleased with the work of the Reef Ball Foundation and its miraculous husbanding of its resources to dedicate them to the work of the Foundation.

Reef areas and shorelines all around the world are better because of the work of the Reef Ball Foundation. We all need to continue to encourage its work.

Sincerely yours,

William H. Izlar, Jr., Chairman

404-307-9894