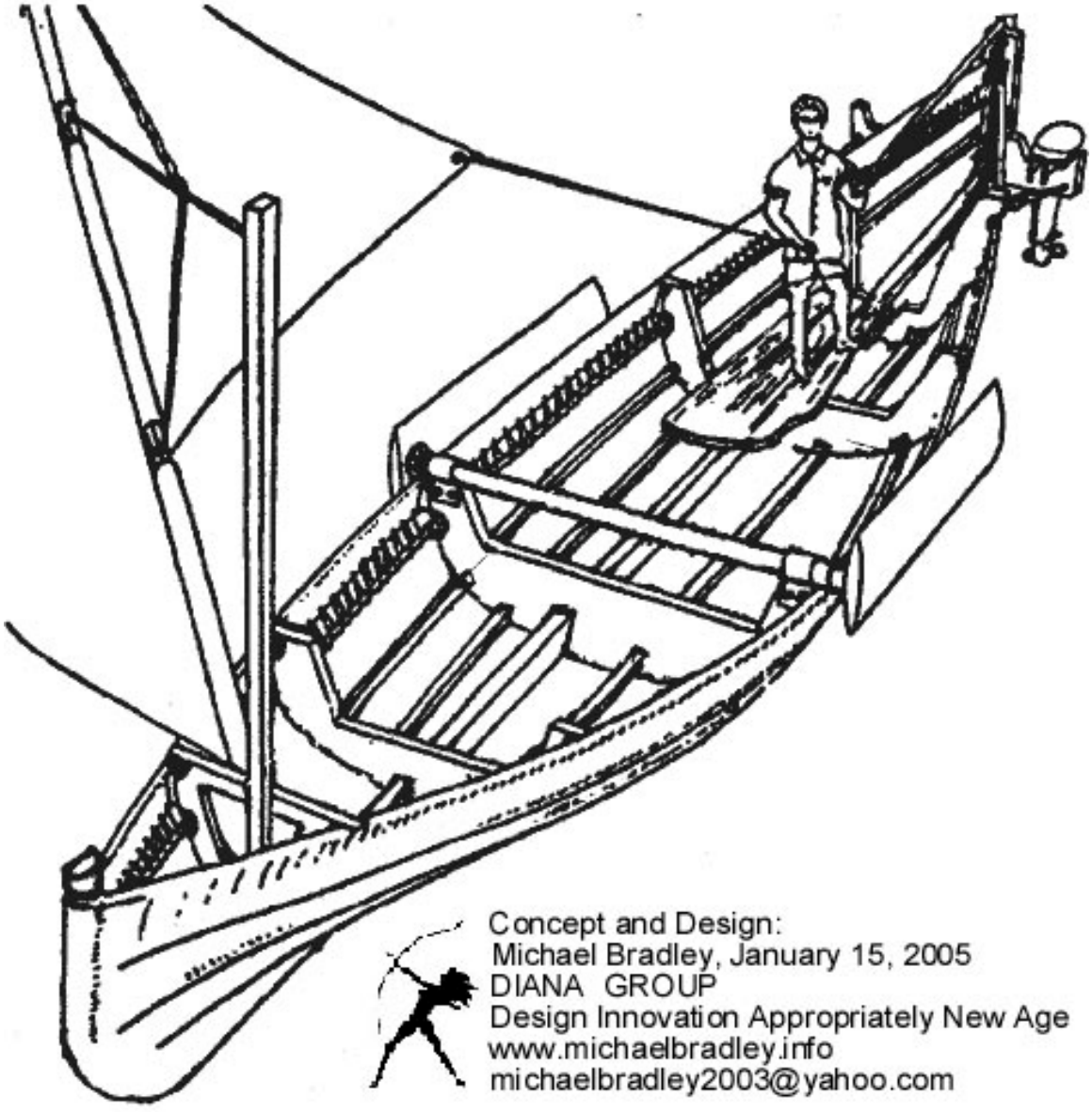
Tsunami Traid Curraghs and Temporary Disaster Homes



Concept and Design:
Michael Bradley, January 15, 2005
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An innovative Canadian development of a very ancient idea could play a crucial role in disaster relief following the recent Indian Ocean tsunami tragedy.

BOATS & BUILDERS

Inshore craft first of three

CANADIAN FLEXIBLE HULL WINS ORDER

FIAT FOR SPEED

One of the author's 32-foot curraghs sailing fast to windward.
From *International Fishing News*, February 1983.

Here's the story – but first there must some very brief background because more than living people perished in the giant waves. Future lives may also be lost or shortened as well.

An estimated 5000-10,000 village ("artisanal") fishing boats were also destroyed in the recent Indian Ocean tsunami disaster. These boats previously supplied 75% of that population's daily protein requirements. Replacing these village fishing boats is therefore a critical step to prevent future death and disease due to malnutrition and to begin recovery and self-sufficiency.

In 1979-1983, in co-operation with the Canadian International Development Agency (CIDA), my company CanTraid Export Limited designed, developed and built extremely inexpensive "flexible hull" fishing boats intended for impoverished coastal "artisanal" fishermen in the Third World. These boats are called **"curraghs"**, or sometimes **"currachs"**, and could be used in the present crisis – and future ones – to quickly re-establish protein production until the region's fishing fleet can be rebuilt.

I am therefore willing to co-operate with international and national aid agencies, church and other humanitarian organizations and committed individuals to make these interim fishing vessels available to the Indian Ocean tsunami victims as quickly as possible.

I have contacted Hon. Aileen Carroll, Canada's Minister in charge of CIDA, Hon. Pierre Pettigrew, Minister of External Affairs, author and CEO Crichton Miller in the UK who is vitally concerned about tsunami relief and I have also contacted some companies who might agree to produce some units.

The idea would be to provide completed "production prototypes" for copying in Indonesia, India, Sri Lanka, etc., and also to provide boats directly to fishermen and

fishermen's co-operatives if a sufficient number of units could be produced quickly enough in Canada, Britain or elsewhere in the Western world.

Although I no longer operate CanTraid Export Limited and do not have facilities for making these curraghs myself, I am willing to co-operate with any national aid agency, aid/humanitarian organization or concerned individual in order to make plans available. I am also willing to supervise production of these "neo-curraghs".

The "neo-curraghs" were designed to require only a minimum of fabrication equipment and skills. Small shops with only 3-4 workers have built them in fair quantities.

Caution: there is a critical design configuration that is not shown on the line drawing or apparent in the photograph. This is because the modification seemed desirable after the first curraghs were built and tested. Also, my draftsmanship was simply not up to superimposing this modification on line drawings intended for newspaper illustrations – and exact illustrations for newspapers didn't seem necessary anyway. Casual readers would only be interested in the general concept.

Now, in view of the present Indian Ocean crisis, I have no time to write a completely "new" description of these 20-year-old CanTraid curraghs. I have therefore lifted a few pages and illustrations from another article on my website and have very roughly edited them and added to them. Here's some information about the concept of curraghs in general and CanTraid's design in particular.

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Curraghs are conventionally thought to have evolved from the primitive skin boats possessed by European Paleolithic hunters about 50,000 years ago. The Eskimo "Umiak" or "women's boat" may be a direct survival of these very early hunters' skin vessels. Alternatively, skin boats or sailing curraghs could also have been developed at an early date by a cultured people who inhabited some now lost Atlantic Ocean land masses.

Curraghs remained in use as the typical kind of fishing and cargo carrying vessels up until the Medieval Period in Irish waters. The ***Navigatio Sancti Brendani Abbatis*** (circa AD 600-700), recording adventures attributed to St. Brendan, described the building of the saint's curragh in detail.

The frame was to be made of ash-wood and the hull of oak-bark tanned bulls' hides was to be sewn together with 19-fiber flax thread treated with beeswax. Curraghs persisted until the mid-20th century as small fishing boats on Ireland's western coast, although by then their hulls were more commonly made from thick sewn canvas.

Between 1974 and 1979, I experimented with three small sailing curraghs on Lake Ontario after doing testing in a home-made test tank. My original idea was to use curraghs for an aid and development project on Africa's Lakes Malawi and Kivu. Because of tank testing and these Lake Ontario experiments, I gradually became very impressed with the sailing qualities and seaworthiness of curraghs.

In both 1974 and 1975, I wrote to Thor Heyerdahl suggesting that his next replicated early voyage might be a curragh expedition across the North Atlantic. But Heyerdahl remained convinced to the end of his life that the first seagoing vessels were reed boats from nearer the tropic zones. He was then already planning ***The Tigris Expedition*** that followed the transatlantic voyages of ***Ra I*** and ***Ra II***.

But I wasn't nearly so sure that seagoing sailing curraghs might not have been developed just as early or even earlier than reed boats – but in the cooler temperate zones. Unknown to me at that time, Tim Severin in Corkmacksherry, Ireland, had precisely the same idea. By late 1974 or early 1975 we got in contact.

I was able to send Tim Severin's naval architect, Britain's acclaimed Colin Mudie, some helpful information based on my continuing amateur tank testing and Lake Ontario experiments with sailing curraghs. I had learned several vital secrets about making and sailing curraghs.

Tim Severin's *Brendan* replica leather-hulled curragh under sail, 1976.

Basic curragh dimensions are crucially important. Curraghs have to be very close to four times as long as they are wide in order to achieve stability under sail. Mudie followed these dimensions with ***Brendan***. I also wrote to Mudie that I suspected traditional Irish curraghs had employed leeboards. Mudie agreed and equipped ***Brendan*** with leeboards, but they were located incorrectly (too far forward) and scooped water aboard. But ***Brendan***, with its traditional sewn-leather hull, proved its seaworthiness by crossing the North Atlantic from Ireland to Newfoundland in 1976 and 1977 over two sailing seasons.

My suspicion was also that at a very early time, seagoing peoples of the temperate zone had discovered the secrets of sailing to windward. But Colin Mudie vehemently disagreed with this and specified only square (downwind) sails for ***Brendan*** as shown above. But the discovery of the world's oldest known sailing ship drawing, the so-called "Danilo-Hvar" potsherd of 1995, does indeed depict a sailing curragh with advanced

"fore and aft" sails for sailing to windward. It is dated to 4000 BC. See "The Jesus Voyage" for in-depth details **on this website**. The link is half-way down the Home Page.

Curraghs are currently enjoying a cultural revival in Ireland, judging from the number of sites on the Internet; there are scores of amateur builders and several curragh regattas.

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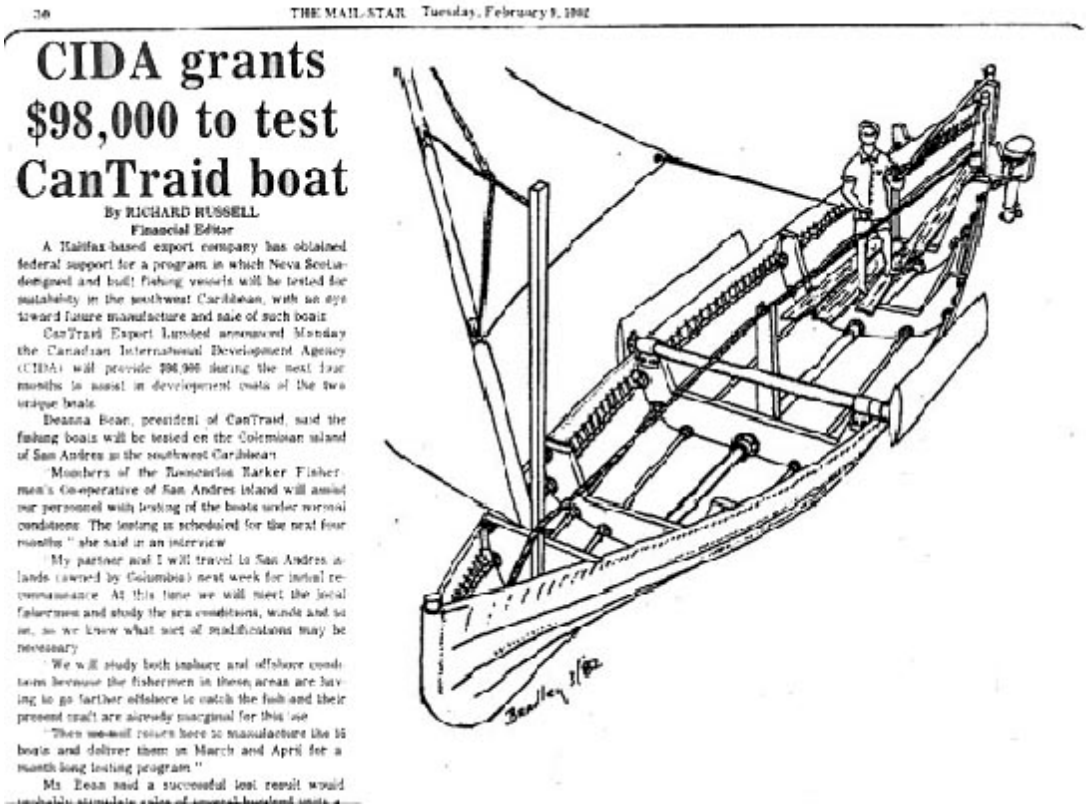
By the early 1980s, I designed and built "neo-curraghs" rendered in modern materials as inexpensive fishing boats for Third World development projects in association with CIDA, the Canadian International Development Agency. Unlike ***Brendan***, these "neo-curraghs" could sail to windward as well as most modern family cruisers (or better). They employed high aspect ratio leeboards that were correctly located. They also featured a powerful Polynesian windward sailing rig. Curraghs are speedy sailers.

For example, Tim Severin's replica medieval Irish curragh ***Brendan*** attained a downwind speed of 12 knots on two occasions. A standard neo-curragh topped 13 knots while being filmed by CBC (Canadian Broadcasting Corporation) news cameras on May 21, 1981. CanTraid's "neo-curraghs" sailed at speeds of 6 to 7 knots on a regular basis when used by Caribbean fishermen in the Trade Winds.



THE MAIL-STAR Tuesday, February 9, 1982

CIDA grants $98,000 to test CanTraid boat

By RICHARD RUSSELL
Financial Editor

A Halifax-based export company has obtained federal support for a program in which Nova Scotia-designed and built fishing vessels will be tested for suitability in the southwest Caribbean, with an eye toward future manufacture and sale of such boats.

CanTraid Export Limited announced Monday the Canadian International Development Agency (CIDA) will provide $98,000 during the next four months to assist in development costs of the two unique boats.

Deanna Bear, president of CanTraid, said the fishing boats will be tested on the Colombian island of San Andres in the southwest Caribbean.

"Members of the Roosevelt Barker Fishermen's Co-operative of San Andres Island will assist our personnel with testing of the boats under normal conditions. The testing is scheduled for the next four months," she said in an interview.

"My partner and I will travel to San Andres Islands (owned by Colombia) next week for initial reconnaissance. At this time we will meet the local fishermen and study the sea conditions, winds and so on, so we know what sort of modifications may be necessary.

"We will study both inshore and offshore conditions because the fishermen in these areas are having to go farther offshore to catch the fish and their present craft are already marginal for this use.

"Then we will return here to manufacture the 16 boats and deliver them in March and April for a month long testing program."

Ms. Bear said a successful test result would

Author's "neo-curragh" design that was manufactured as an inexpensive Third World fishing boat with the involvement of the Canadian International Development Agency (CIDA), 1979-1983. Epoxy tubes and canvas hull skin replaced the traditional curragh's ash-wood frame and leather hull.

This sort of speed approximates the speed of typical Indian Ocean fishing "catamarans" used by village fishermen before the tsunami disaster. **This speed is necessary in order to get the catch back to village consumers before it spoils in the tropical sun.**

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I should devote a few words to the almost automatic objection to the idea of a fabric hull (either modern canvas or traditional leather). Mind you, this objection is almost invariably voiced by people who have no experience with boats!

A curragh's hull **can** be punctured. But the operative word is "can".

It is much more difficult to puncture thick plastic-impregnated canvas (or leather) than the average person might think. CanTraid curraghs operated in a region of plentiful coral formations in the Southwest Caribbean. A few CanTraid curragh hulls did get scraped by coral, but not one was ever punctured badly enough to leak seriously. The dugout canoes they replaced habitually leaked more than even coral-scraped curraghs because the wooden dugouts had cracked bottoms due to constant sun exposure. Then, of course, the curragh hulls could easily be repaired or refurbished with a needle, thread and a canvas patch. This could be done at sea but never proved necessary. The fishermen just bailed (they very were used to bailing their former dugouts constantly) and waited until they returned to their villages.

Brendan suffered a small but serious puncture below the waterline in 1977 when the boat was caught in the same ice pack that sank the 6000-ton steel-hulled Canadian ferry ***Carson***. But ***Brendan*** was patched at sea and continued its voyage successfully.

Properly designed and made, a curragh is more resilient than any wooden boat. Cantraid test-sailor Rufus Stewart of Halifax, who had crossed the Atlantic single-handed in the 12-metre yacht ***Polaris***, rammed a standard curragh into a concrete breakwater at 10 knots.

This was for the benefit of CBC news cameras during a demonstration on May 21, 1981.

It bounced off with only scuffed canvas to show for it. The impact would have seriously damaged any modern wooden or fibreglass boat. Stewart also told a CBC interviewer quite frankly that he would take a CanTraid curragh across the Atlantic with the sole modification of a canvas cover over the standard open hull.

In spite of this endorsement from a well known transatlantic sailor, CanTraid and I experienced continual difficulties with CIDA, difficulties that finally made me abandon the project in 1983. But this was after I had developed the curragh concept's viability for Third World aid to my own satisfaction. I think CIDA just could not get used to the idea of a flexible hull! CIDA's "small craft expert" of that time admitted that he had never even been in a small boat! He certainly never once dared to step into my curraghs.

9.7 Meter Canvas-hulled Configuration

The one-piece canvas hull was made purposefully baggy so that it would ensure a fit over frame matrices which might vary slightly in dimension due to assembly under "beach" conditions. The canvas hull was designed to shrink tightly over the frame matrix after launching, giving strength in compression and a smooth hull surface.

Rufus Stewart and Jane Stewart sailing the canvas 9.7 meter. Note smooth hull due to shrinkage. The traditional lateen was later modified to include a steel support for the base of the lateen yard, resulting in more convenience and improved performance.

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It should also be mentioned that it is easier to catch fish, and more fish, using a curragh rather using than any type of solid-hulled boat. Also, curraghs discourage attention by ocean predators like sharks (*another* objection once raised by CIDA's "small craft expert" about the CanTraid 32-foot curraghs).

This is because the frame and flexible skin returns a sonar echo that is similar to that of a large porpoise, "dolphin" or a small pilot whale. These toothed whales are predators themselves, but they seem to feed only at certain times of the day and species of their favourite prey fish are aware of this. During most of the day, fish like tuna and kingfish try to stay in wary proximity to toothed whales – and curraghs. This is because these toothed whales are known to be enemies of sharks and kill them by butting them in the stomach. Sharks are much less predictable predators of tuna and kingfish than toothed whales. Prey species therefore try to stay near toothed whales as "the best of a bad bargain" in terms of survival strategy. Sharks tend to avoid toothed whales (and curraghs), while dolphins and porpoises seem to like playing around curraghs.

Although so-called "experts" told Tim Severin that ***Brendan*** would quickly be attacked and eaten by sharks because of the boat's edible leather hull, in fact Severin and his crew seldom even saw a shark during their North Atlantic crossing – and only then at a long distances. They did, however, have frequent visits by inquisitive and friendly porpoises, dolphins and pilot whales.

The same phenomenon occurred in the shark-infested Southwestern Caribbean. Sharks tended to stay away from the immediate vicinity of curraghs although they had been a constant menace to men fishing from their previous large dugouts. Dolphins frequently came around the curraghs and the Caribbean fishermen noticed that they also caught a few more kingfish each day than they were used to doing from their previous dugouts.

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Tsunami disasters have apparently increased in frequency during the period 1950 to 2000. Japan suffered two major tsunamis during the 1990s when previously only one tsunami was experienced during the past two decades. A list of 20th century tsunamis is on the Internet. The reason for increasing frequency of tsunamis is apparently intensive offshore oil exploration and extraction combined with the fact that the vast majority of the world's population has always lived in coastal areas. There is a proven correlation between oil extraction and the subsequently resulting displacement or subsidence of tectonic strata – earthquakes. Offshore submarine earthquakes cause tsunamis of varying magnitude.

If the seas are shallow and the coastal bottom is gently shelving to the shoreline, the tsunami waves will be higher. It is that simple. This is the case all around the margins of the Indian Ocean, including Indonesia and northern Australia. But the same situation also exists in parts of the Caribbean and Gulf of Mexico, the (Persian) Gulf, Gulf of Oman, Arabian Sea, Red Sea and the Gulf of Alaska off Canada's West Coast. The same situation exists off Canada's East Coast bordering the Gulf of Maine and the St. Lawrence River estuary.

The probability is that the current Indian Ocean situation was at least partly man-made. Oil drilling off the coasts of Sumatra and Java has greatly intensified since the 1950s.

This is true all over the world where the continental shelves have been ever more urgently tapped for petroleum deposits.

Therefore, the world can expect further tsunami disasters.

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In a proposal to British author Crichton Miller, who is also Chief Executive Officer of the large British trucking firm Haul-IT Nationwide Limited, I have outlined a long-term "strategic" plan for disaster relief. A stockpiled fleet of "neo-curraghs" could be deployed very quickly in affected areas in order to restore local protein production and a sense of self-sufficiency as rapidly as possible after a disaster.

Neo-curragh parts awaiting shipment, 1982. The skis were not part of the aid package!

These neo-curraghs would be a stopgap measure until local village fishing fleets could be re-built according to the traditional boats of various geographic regions. A plastic-paint

impregnated thick canvas hull, with an anti-fungus additive to the plastic paint, can last about 5 years with careful handling in launching and beaching.

After a period of temporary emergency use for disaster relief, then these curraghs would be retrieved, refurbished and kept in a stockpile for response to the next disaster. The required organizational infrastructure would be supplied by regional NGOs (Non-Governmental Organizations): fishermen's co-operatives, women's sewing co-operatives and woodworking co-operatives.

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This strategy would entail a modification to the original 1979-1983 CanTraid 32-foot curraghs to allow them to be assembled and then "dis-assembled" for refurbishing, storage and subsequent re-assembly and re-use.

Most of these modifications had already been developed by 1983.

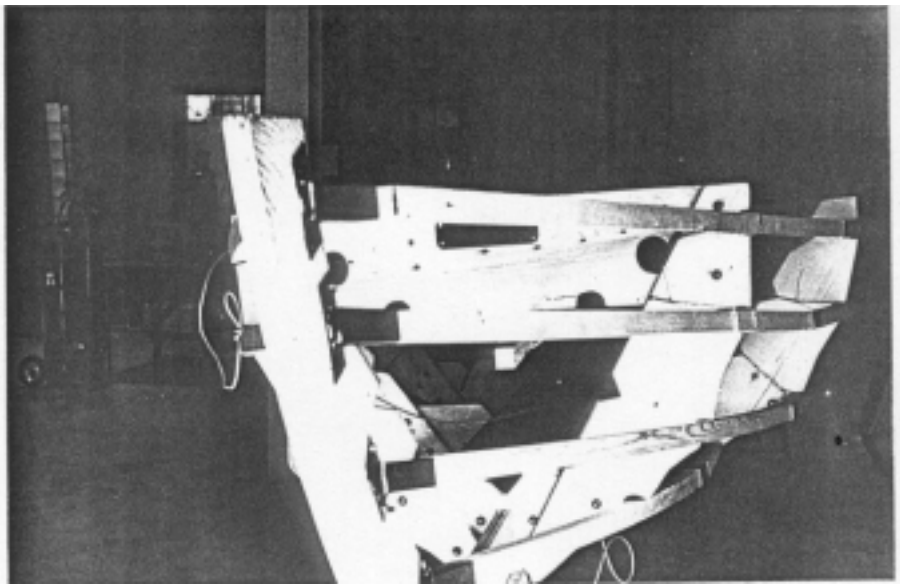
Because of the Indian Ocean tsunami disaster of December 26, 2004, I began to remember and complete these modifications, starting with many calculations. British author Crichton Miller, who is also CEO of Haul-IT Nationwide Limited of Rugby, England, commissioned me (the "DIANA GROUP") to draw up these almost-forgotten 1983 modifications into actual construction drawings on January 11, 2005. Working from old photos and memory, I also added some improvements.

Retaining the same basic dimensions and sail which worked very well, the modifications basically involve replacing the epoxy tube keel with laminated plywood and replacing the epoxy tube longitudinal stringers with solid spruce. These stringers would fit into welded steel sockets at bow and stern.

These plans were scanned and digitalized during the week ending January 22, 2005. They can therefore be transmitted almost instantly wherever needed to government agencies, private and church aid organizations, manufacturers and other *serious* potential sponsors all over the world.

These modifications mean that the boat can be taken apart instead having a framework that is epoxied together "permanently". But these modifications should be tested on at least one curragh in order to assure strength and seaworthiness combined with ease of assembly-disassembly on local beaches by local people. Crichton Miller and Haul-IT Nationwide Limited are making arrangements with Irish curragh-builder Padraig O'Duinnin to construct a neo-curragh production prototype according to these plans in late January and February 2005.

Below is one example of some old photos from which I re-drew the 1983 modifications.



Bad quality photo dating from 1983 of plywood frame version with spruce stringers. Note welded steel sockets on the bow and steel sleeves along the longitudinal stringers. The 2005 plans have reduced the number of steel sleeves from 13 to 5.

It is worth noting here that both written and oral instructions for curragh assembly will have to be supplied in several languages on audio or video cassettes. This is because many artisanal fishermen are illiterate and cannot read.

This is an extremely challenging project in itself, of course, but one that is just as important as making the curraghs. Naturally, all necessary tools for assembly must be supplied as well, and keeping these to a minimum is a basic design consideration.

It is unfortunate, but all too typical, that no Canadian government Minister, aid agency, company or supplier of plywood has responded to this proposal. No major Canadian daily newspaper has printed an article about it and there has only been one CBC radio interview out of Halifax. But British and Irish individuals and corporations have risen to the challenge of using a Canadian innovation to alleviate a massive human disaster.

Another advantage of this modification from the original 1974 -1983 epoxy-tube frames, which may be explored by Haul-IT Nationwide Limited and Padraig O'Duinnin, is that it is possible to sheath the hull with thin plywood instead of canvas.

This version would employ the "stitch-and glue" method of fishing boat construction. Sewn-together boats are thought to have been invented by the Arabs about AD 800 and subsequently "re-invented" by Impex Southern and Gifford Technology, both of England, for the on-the-beach construction of Third World modern aid-business artisanal fishing boats. Modern "stitch-and-glue" construction

uses lengths of galvanized steel wire twisted together with pliers as "stitches" which are then covered with epoxy resin and fiberglass tape as "glue". This method as rendered in modern materials results in extremely strong hulls that can be surprisingly beautiful.

Using this method on the plywood and spruce curragh framework in early 1983, I called the resulting boats "quasi-curraghs" because the basic curragh principle was preserved but the hulls were no longer so truly flexible as with the "neo-curraghs".

When such plywood quasi-curraghs are dismantled after a period of disaster relief usage, there will probably be some damage to the thin plywood panels comprising the hull sheath, but there should be no damage to the basic laminated plywood frame and spruce stringers. But it is easy and cheap to cut new panels from ¼-inch plywood as may be required. And be assured that any scrap will be used for *something* in the Third World.

Hull templates for "quasi-curragh", 1983.

This is a long-term plan, obviously, in view of the probability of future devastating tsunami disasters. But, of course, these neo-curraghs and quasi-curraghs could be equally useful for other natural or man-made disruptions of regional sea harvesting of protein, such as hurricanes and typhoons.

The need is immediate in the present Indian Ocean disaster and its terrible magnitude is currently focusing the world's sympathetic attention.

But aid agencies, church and humanitarian organizations and concerned individuals should also think and plan for the longer-term.

Plywood hulled "quasi-curragh", early winter, Halifax 1983.

Packing crates and "Temporary Disaster Homes". As modified with the laminated plywood frame, spruce stringers and metal sockets and sleeves to permit easy initial assembly on the beach and later dismantling after a period of disaster use, these neo-curraghs and quasi-curraghs are too heavy and bulky to use their own canvas hulls as packages to contain the components. Some of the necessary steel connecting parts do have extensions that could puncture a canvas hull in transit.

Therefore, sturdy packing crates must be designed and made. The most convenient size to fit into a container will hold two curraghs each. Two such crates will fit into a standard-sized 20-foot container, or 4 neo-curraghs or quasi-curraghs.

I ("DIANA GROUP") have designed these crates to come easily together to make 1 "Temporary Disaster Home" that is roughly 19-feet in length, 7 ½ - feet wide with a 7-foot ceiling. Because of the danger of malaria in the tropics, and especially after a tsunami disaster, the "Temporary Disaster Home" has two screened windows with interior plywood shutters and one 6-foot high Dutch door with both halves screened.

Attached to this "Temporary Disaster Home" is a full-length 7 ½ - foot wide porch and roof that is protected all around against mosquitoes with flexible polyester mosquito

screen-cloth. In the tropics, because of the heat, it is usual for the people to sleep outside for much of the year and this screened-in porch allows them to do so safely.

Therefore, in one 20-foot container is 1 “Temporary Disaster Home” plus 4 neo-curraghs or quasi-curraghs. Twice as much could go into a standard 40-foot container.

And, of course, the packing crates do not **have** to be filled with neo-curraghs or quasi-curraghs! For disasters in inland locations, they can contain other things: donated clothing, basic bulk foods, cooking utensils, medical supplies and so on.

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Such a longer-term strategy for responding to future tsunami and other disasters could be significantly more relevant with another “low-technology” or “appropriate technology” device that was also developed by CanTraid between 1979 and 1983. Again, fabrication of this device requires only minimal production facilities and worker skills.

Interested readers can view several photos and a newspaper story about the 20-year-old CanTraid “wind-motor” on the Site Index of my website www.michaelbradley.info under the section called “Appropriate Technology”. But I have posted one illustration below for immediate reader convenience. Fifty full-size units have been built and are working, or were working in 1983, producing 1.5-2 KW of electricity in trade wind and monsoon zones. Constructed of steel or aluminum tube, one test unit was mostly bamboo!

Below is a photo of a large-scale (6 feet high) **working** model of an electricity-producing wind-motor. It produces sufficient electricity with a miniature generator to light small 12 VDC bulbs (automotive brake lights in this case). A model for demonstration and photographic purposes was necessary because the actual wind-motors are over 20-feet high, 5-feet in diameter and the whole package weighs about 500 pounds – inconvenient for transport in order to give demonstrations to groups of interested people and almost impossible to photograph without distortion.

Working wind-motor model. Male figure is a scale 6 feet tall. .

This vertical axis, omni-directional and self-starting aeroturbine or “windmill” was specifically designed to be a portable electricity-producing device for the tropical Third World in trade wind and monsoon zones.

Its most obvious use as a disaster relief adjunct to neo-curraghs would be to supply lighting and sterilization for medical teams without recourse to fossil fuels like gasoline and diesel-powered electrical generators.

But wind-motors can bring usable amounts of electricity to any Third World home, **including “Temporary Disaster Homes”**. Therefore, a more complete disaster relief package **could** comprise 2 neo-curraghs (or quasi-curraghs) and 2 wind-motors within 1 “Temporary Disaster Home” (one “more complete” such aid package to each 20-foot container). Wind-motors are lighter and less bulky than curragh components, so there would enough room with **this** combination within the packing crates for clothing, some basic bulk foods and medications (like water purification tablets) along with some cooking utensils. This package would be intended for disaster relief of one large family or two smaller ones. But wind-motors have also been mated to a variety of modified power tools (drills, wood saws, grain and cane crushers) that would assist with speedier disaster reconstruction. An appropriate selection of these **could** also be included.

In 1983, a wind-motor was even installed on a neo-curragh to provide an alternative to conventional sail or outboard power. Drive was via a vertical impeller-pump type of “propeller” operating through a round canvas “outboard well” alongside the keel. The same modified drive could be incorporated in a quasi-curragh just as easily. This innovation meant that people with no sailing experience whatsoever, who might be pressed into service to be temporary fishermen following a disaster, could actually and immediately contribute significantly to food harvesting.

CanTraid Export Limited ceased operations long ago. But because of a recent resurgence of interest in appropriate technology, I formed a small operation to supply plans and specifications for the wind-motor and now – because of the current Indian Ocean tsunami disaster – I will now include the neo-curragh plans.

For national and international government aid agencies, established corporations, well established church groups and individuals who can demonstrate their serious commitment to tsunami aid, I am willing to work out arrangements for making “neo-curraghs”, “quasi-curraghs”, “Temporary Disaster Homes” and “wind-motors” on a nominal royalty-per-manufactured-unit basis. Individuals wishing to make a neo-curragh, quasi-curragh or wind-motor for their own private use can also contact:

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