Eleven Cuban migrants attempt to reach the United States on a Chevy flatbed truck rigged with pontoons, in the Straits of Florida. The 'if it floats use it' maxim could put professional responders' lives at risk in anything but the shallowest, most benign of flood situations.

photo: USCG / Fireman Greg Ewald

Flood rescue craft

In many countries, Fire and Rescue services are using boats unsuitable for safety or workboat use. **Cliff Shorter** and **Seb Freeman** look at how a water standards study in the UK aims to improve safety for responders on water

Considered newsworthy by the media, we often see 'rescues' being undertaken with people floating by on beach lilos, in tin baths and on wooden crates. While this may be considered laudable self help and a last resort by desperate people, it has little to do with the provision of a professional service. The 'if it floats use it' maxim is likely to put professional responders' lives at risk in anything but the shallowest, most benign of flood situations.

Floods created by Hurricane Katrina devastated the American coast in the Deep South; water surging at 20 knots through Tapachula in Mexico destroyed everything in its way and in Cumbria, UK, recent floods destroyed homes and businesses on a wide scale.

Only with foresight, planning and ingenuity will we be able to minimise their effects.

Considerable energy and effort has been expended by the Emergency Planning and Emergency Services across the globe to predict areas of greatest risk and to mitigate the disruption that floods present to the community. The many issues associated with flood management will be addressed in *Crisis Response Journal* over the coming months. As part of the broader debate here, we will consider just one technical element – the major parameters that underpin the choice of flood rescue craft.

In a study entitled Project Aquarius, undertaken by the authors of this article on behalf of the Office of the Deputy Prime Minister, it was found that in the UK alone, Fire and Rescue services were using 15 different types of vessel for water rescue. Often the vessels were designed for recreation rather than safety or workboat use. Some were liable to be used in water conditions where they would not provide a safe haven for rescue personnel or rescued casualties. Aquarius recommended that craft choice should focus on water conditions, suitable hull design, appropriate propulsion and safe operability.

Risk analysis

Dynamic risk analysis has taught us among other things, to select the right tools for the job. This is never more important than when selecting a vessel for use in flood conditions.

For still or slow running flood water, Durable Utility Craft manufactured from advanced composite materials are highly suitable. Although almost flat bottomed, these vessels are exceptionally stable, lightweight and instantly useable when delivered to the activity site. The advanced composite materials are hard wearing and extremely resistant to penetrative damage from debris, sharp objects and groundings. A low freeboard permits easy boarding and their high degree of positive buoyancy enables the craft to continue floating when fully swamped.

They are man-portable over short distances, easily launched and recovered, and can be towed in stacks of five behind light road vehicles. Lightweight and compact, their dimensions meet with air transport load requirements and stacked craft can be delivered close to flood sites by most military and commercial air carriers.

For open and medium flowing water a more substantial vessel is required. Key features here include robust hard wearing construction materials and an underwater shape that enables the craft to cross, head into or flow with, disturbed currents.

Boats to meet these conditions are readily available commercially, having been designed originally for the transportation of fully laden troops. They have a high payload and are stable in all load conditions. Easy to handle, they are usually powered by outboard motors to give service speeds in excess of 20 knots, but can also be paddled or towed in certain situations. Water conditions that are fast flowing, highly disturbed, unpredictable or tidal dictate the selection of rescue craft of at least six metres waterline length.

Here, large capacity trihedral hull forms ensure great stability while retaining shallow draft operating ability.

On these larger craft the geographical range and time on station can be greatly extended and the multi-engine configuration provides users with the comfort of redundancy power should one engine fail. To exploit the full rescue potential of these craft, the coxswain and crew will need to be highly trained and experienced.

Towing

Often we see pictures of rescuers in shallow water walking along towing light craft. While this makes for good television it is not safe practise. Flood water is often contaminated and holes in the ground from hidden road works can extend water depth from 30 cm to three metres in an instant.

Even in shallow, still water flood conditions rescuers should be in the boat. They may then choose to use paddles, be towed from the banking or use engines.

The two main types of power propulsion are propeller or jet drive. The propeller drive is most commonly used on outboard motors or via a stern drive leg and an inboard diesel. Jet drives are normally driven by inboard diesels. However there are outboard motor variants fitted with a jet on the bottom. Different methods of propulsion have different characteristics and the choice of which type to use can be critical to an operation.

The propeller will give a good power to weight ratio. This enables small outboard motors to drive laden craft against currents and flows with medium to high manoeuvrability. The small size also offers the advantage of twin installation, giving greater manoeuvrability and reliability. The downside of this is that an exposed propeller may cause injury, or damage itself on underwater obstacles. This can be mitigated by the use of propeller guards. However these will reduce the vessel's passage efficiency by up to 50 per cent.

The jet drive boat can be used in very shallow water and is very manoeuvrable, being able to travel at a slow speed while keeping full steering control. This is very beneficial when stemming flood water and holding position. However, most jet drives are driven by diesel inboard engines, which can be heavy. Also, the size of the diesel engine normally excludes it as a twin installation, so there is no redundancy should a drive fail.

Good maintenance of any piece of rescue equipment is essential and boats are no exception. It is important that any rescue craft is built to a high commercial standard to ensure the best chance of all round reliability in adverse conditions. The choice of propulsion should be backed by ease of maintenance concentrating on water intake filters and fuel filtering. Having the right tool for the job is critical. But the right boat means nothing without correct training.

With the variety of flood situations that can be faced, a broad spectrum of training is essential. Options should include shallow water operation, fast flowing water, urban search techniques, all weather and night operations, operating in polluted water. All rescue professionals who work near, in or on water, must have focused, appropriate and timely training. A coxswain trained for slow flow established water course rescues would be at considerable risk on the same piece of water during a flood.

Accommodation, deck fittings, long endurance tanks, self-righting capability, maintainability, air portability, man-portable, ease of launch and recovery and many more considerations also need to be addressed.

The right tool

A cautionary note must be made, however, that there is no 'boat for all seasons', and that a rescue boat designed for known and definable watercourses may not be suitable when those water courses are themselves beneath widespread flood waters. Similarly, a fire boat is unlikely to fulfil the role of a flood rescue craft. Rescue boats are work boats, they are constructed to commercial workboat standards and we owe it to our rescue teams to provide them with training that can match the safe operating of the craft.

Emergency planning and preparation is about ensuring our rescue professionals have the right kit, in the right place, at the right time.

Floods present just one type of emergency. Funds are not limitless and the reality is that floods are generally seasonal, but often capricious by sometimes not happening at all for several years.

Floods are a global problem, by establishing stocks of suitable flood rescue craft at vulnerable sites around the world we would reduce the financial burden on individual organisations and ensure better utilisation of resources.

International funding and administration (perhaps via the United Nations) of this provision could herald the introduction of a truly international flood rescue capability. CRJ

Authors

Cliff Shorter *of VT Emergency Services is responsible for the design of Training Solutions for Fire, Rescue and Civil Defence agencies;* **Seb Freeman** *of VT Halmatic is responsible for the provision and support of work boats for specialist applications around the world*