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# Raking It All Up After 10 Years

Andy Smith
*Humanitarian Mine Action Specialist*

# Raking It All Up After 10 Years

by Andy Smith [ AVS Mine Action Consultants ]

FOCUS

For two years, Norwegian People's Aid (NPA) in Sri Lanka has provided assistance to the Tamil demining groups and authorities, helping them to refine their own systems and to meet the requirements of the International Mine Action Standards. Uniquely, they have achieved this without losing the low-cost features that are essential to any locally sustainable method. Recently NPA has begun to support a similar process in government-controlled areas, working with both the army—in cooperation with RONCO—and civil demining groups. Their civil partners are the Milinda Morigoda Institute for People's Empowerment, HORIZON and SARVATRA—the first is a local Sri Lankan non-governmental organization (NGO) moving into humanitarian demining and the latter two are demining branches of development NGOs based in India and staffed by experienced deminers.

## Clearing Mines With Rakes

The clean-up after "Gulf War 1" was actually a little more than 10 years ago—but it was the first time I heard about the use of rakes to find mines. Back in those days, Royal Ordnance were active in Kuwait alongside deminers from many countries. Referred to rather disparagingly as Third Country Nationals (TCNs), deminers from India and Pakistan used rakes to expose mines in the desert. I am told that Royal Ordnance gave the rakes a try but did not take them up. The threats included V69 bounding fragmentation mines with tripwires and tilt-sensitive fuzes, so their rejection made good sense. A lot of TCN accidents during 1991–1993 are on record, but not in detail.

The idea of clearing mines with rakes was discredited and the potential was ignored by mainstream groups in humanitarian demining. I was among those who dismissed the use of rakes as obviously dangerous. I was wrong.

In Kosovo in 2000 and 2001, leaf-rakes were used under Luke Atkinson's direction—with the demining group Danish Church Aid—to remove the forest leaf-litter and expose PMA-2 and PMA-3 mines in well-defined mine belts. The rakes set off no mines. Detecting minimum-metal anti-personnel mines with metal-detectors in those areas was a hit-and-miss affair, as the accident record shows. Exposing them with the rakes was faster and probably safer.

At the start of the new millennium in Sri Lanka, demining was being conducted on both sides of the border between government and Tamil forces. With limited funds and extensive human resources, both sides used a low-cost, labour-intensive "raking" technique. The Tamil's Humanitarian Demining Unit (HDU) managed demining in Tamil-controlled areas. They used short-handled rakes without marking the area, without imposing any safety distance and without wearing any personal protective equipment (PPE). Across the border, government forces wore PPE, but paid similarly scant attention to the concept of safety distances and area marking. Clearance on both sides of the border was "successful," but there were severely disabling casualties and the random method meant that the ground had not been thoroughly cleared.

When NPA was invited to advise the HDU in 2002, it would have been easy for them to dismiss the rakes and impose metal detector drills. The cost of importing hundreds of metal-detectors would have been high, but many saw no alternative. However, Luke Atkinson was made the NPA programme manager. He saw that the raking was potentially as thorough as sieving the ground. Therefore, he believed, it would be very attractive if it could be controlled within a marking and safety package that would be effective in preventing missed mines and accidents. NPA looked at ways to refine the tools and to control rake-use within site marking and supervision regimes that would create an entire system that would be accepted within mainstream demining. That system is the Rake Excavation and Detection System, known as REDS.

The REDS uses two simple raking tools to excavate and sift the ground to the required depth. Conventional demining site markings are used, and the sides of lane depth trenches allow effective quality assurance of depth. A "Base-trench" across the front of the lane marks the extent of the processed area. Loose soil is brushed from the uncleared area into the Base-trench, and then packed to the rear of the trench. When the use of the Brush-rake becomes ineffective, the Harrow-rake is used to scarify the ground, allowing the Brush-rake to be used again. The Base-trench rolls forward as work progresses, which can be surprisingly fast in ideal ground conditions.

The Brush-rake has flexible tines that exert little pressure in any one place on the ground. Many thousands of mines have been exposed using it, and none have ever detonated. The Harrow-rake is heavier and is used both to scarify the ground and to lift shallow mines to the surface. If used incautiously, mines can be initiated by hitting the rake-head on the ground. This has happened several times, but no serious injuries have occurred. The long handle on the Harrow-rake keeps the deminer at a distance from the blast, and the PPE that is now part of the REDS system completes the protection against small AP blast mines very effectively.

The early design of the Harrow-rake head was very cheap and worked adequately in loose, sandy soils. It has recently being revised for use in harder soils by NPA and SARVATRA. Their revision of the Harrow-rake uses a material with a proven record of maintaining integrity in AP mine blasts (low-grade stainless steel). The tools dig into and cut the ground without the need to apply any downward pressure and can be refurbished peri-

LEFT: *The Brush-rake in use on HDU sites.* RIGHT: *The heads of SARVATRA/NPA Harrow-rakes.*

*The jungle on the left needs to be transformed into the loosened ground on the right so that REDS can be used efficiently in a wider range of conditions.*

odically to have a very long life. Locally made, they cost rather more than the original rake design, but do not cost as much as three sets of Duracell batteries for an alternative metal detector.

In Tamil-controlled areas, the HDU/NPA are field-trialling the new design with anticiation of its widespread adoption. NPA and SARVATRA are refining the design further, to make the REDS applicable on even harder ground and to make refurbishment a simple field exercise.

Because the REDS system sieves the ground, it gives the kind of complete confidence of clearance to the required depth that metal detectors and other area-excavation techniques cannot achieve. This conclusion is among the results of the Geneva International Centre for Humanitarian Demining (GICHD) comparative trials of manual demining systems, which took place in Mozambique during October/November 2004.

The main limitation of the REDS system is the time that it can take to complete when there is dense undergrowth or the ground is hard with complex root systems.

To solve this problem, mechanical means of preparing the area have been devised by SARVATRA in collaboration with NPA.

## Mechanical Preparation

The use of machines in humanitarian demining is rarely cost-effective, environmentally friendly or sustainable. SARVATRA and NPA are proving that this need not always be the case. For more than a year, SARVATRA has been using adapted construction-site machines to provide the platform for vegetation cutters. The platforms are low-cost earth-moving machines with hydraulic arms designed to carry excavation buckets for use on building sites. The hydraulic arm reaches out into the minefield while the machine stays on safe ground.

With NPA assistance, those platforms have been recently armoured and new ground preparation tools have been made. The platforms are being used in advance of the manual deminers using the REDS system. The tools remove dense undergrowth and scarify the ground, raking it to depths beyond that needed for confident mine clearance. The mechanised vegetation cutters and rakes are not designed to expose or detonate mines, but merely to break up the ground so that manual REDS can be rapidly conducted behind the machine.

## Conclusion

At a unit cost of less that $30,000 (U.S.), the machine costs less than a good 4x4. Unlike large flails, they do not turn the ground into dust, destroy mature trees nor disrupt patterned mine belts. The use of widely used plant machinery means that spare parts are readily available, servicing is simple, operation is straightforward, and the machine can be converted back to conventional uses by retrofitting its original tools in a matter of minutes. This versatility is unique and guarantees that the machines will not have to be scrapped when their demining roles are over.

Drills for deployment are currently being refined, and further tools developed to make maximum use of the potential provided by these versatile assets. Mechanised vegetation removal and ground preparation will mean that the REDS can be used in many more mined areas around the world.

So after 10 years spinning in a backwater, the simple low-cost rake has finally drifted into the mainstream of demining technology. Both hand-held and mechanised, they are sustainable, cost-effective and—when used in a well-designed system—give total confidence of clearance to depth. I wish that the same were true of metal detectors. ❖


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### Contact Information

Andy Smith
AVS Mine Action Consultants
E-mail: avs@nolandmines.com
Website: http://www.nolandmines.com

NPA, Sri Lanka
E-mail: luke_sj@hotmail.com

SARVATRA, Sri Lanka
E-mail: prempuri555@hotmail.com


*SARVATRA's locally adapted ARJUN machine in Sri Lanka.*