

**Could the Skyhydrant potable membrane system be a solution to assist China achieve safe, affordable and sustainable rural community drinking water ?**

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IWA Beijing  
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[www.skyjuice.com.au](http://www.skyjuice.com.au)

Skyjuice Foundation – Pure water for every child

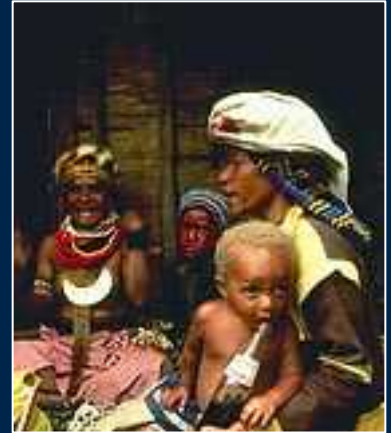
# Overview of this presentation

- The challenge for China to provide ultra low cost potable water for rural communities
- Summary of SKYJUICE technology
- Details of SKYHYDRANT and SKYstation
- Operating data and field results
- The economics of low cost water
- Where to from here
- Joint leadership on the issue



# The wider global challenge

- An estimated 2.6 billion people representing half of the developing world lack toilets and improved sanitation. If the 1990-2002 trends hold, close to 2.4 billion people will still be without safe sanitation by 2015



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# Immediate actions

- **There must be meaningful partnerships between rich societies and poorer countries to assess the immediate needs to address developing countries' access to water, sanitation, technology, medicines and jobs (incomes) for their growing populations**
- **Low cost sustainable potable water must be an immediate priority**

# Large numbers in China

- In spite of progress in all regions, there are still 1.1 billion people in the world using potentially unsafe water supplies. Of the 1.1 billion of people without access to safe water, nearly two thirds live in Asia, with almost 180 million in China alone.
- Access will need to be provided to an additional 1.2 billion people – The equivalent of establishing new water supply services for about 300,000 people each day until 2015.

# China issues and factors relating to the provision of safe rural drinking water

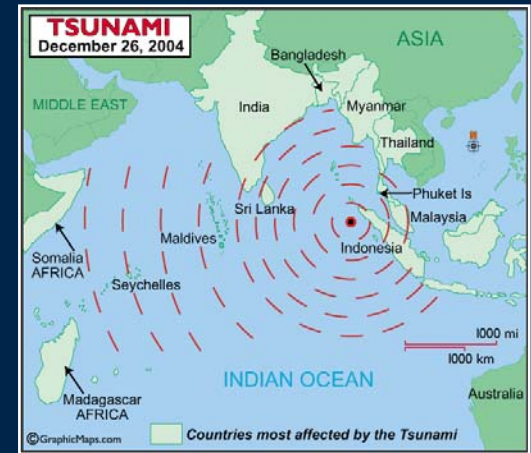
- Identification of a reliable safe supply (cross contamination)
- Saline verses non saline supply
- Sanitation and hygiene education
- Groundwater sewage contamination
- Local communities ownership
- Affordability and ongoing costs
- Direct operating costs
- Treatment verses reticulation
- Immediate expectations of the people
- **Treatment of the feedwater**



Typical surface feed water Sri Lanka

# Summary of SKYJUICE technology

- The " SkyJuiceTM " Foundation is a non profit charitable organisation providing treatment solutions and assisting existing established agencies
- Utilises UF membrane technology to provide low cost sustainable potable water and effluent reuse installations in accordance with MDG guidelines
- Globally endorsed by Siemens, Clean up the world
- Over 300 units potable water supplied with 250 + into Tsunami effected countries including Sri Lanka, India East Timor, Indonesia, Thailand, Laos, Pakistan, Vietnam, Bangladesh, South Africa , Maldives
- MOU's and relationships with OXFAM, World Vision , Red Cross, W.H.O., ADRA, Caritas, UNICEF OZ Green, Samaritans Purse and others
- Installed in schools, IDP centres, hospitals, clinics, villages and refugee centres
- Patented and registered designs for water purification systems of the foundation include,
  - SKYstation
  - SKYHYDRANT
  - AQUABOY



# SKYHYDRANT and SKYstation technology

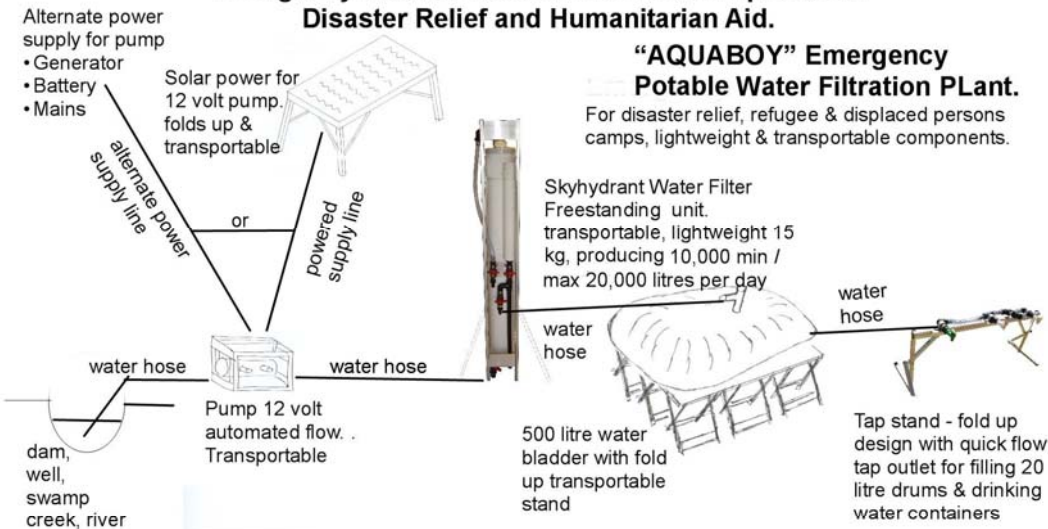
SKYJUICE Model Number	SMF
Number of sub-modules	1
Membrane Material	PVdF
Membrane Pore Size ( $\mu\text{m}$ )	0.04
Maximum Recommended Feed Particle size ( $\mu\text{m}$ )	500
Maximum Recommended Feed Turbidity (NTU)	500
Filtered Water Turbidity (NTU)	<0.1
Log Reduction Value for Particles 2-5 $\mu\text{m}$ (LRV)	>4
Filtration Operating Mode	P or S
Minimum Recommended Differential Pressure (m)	0.5
Maximum Recommended Differential Pressure (m)	4.0
Nominal minimum capacity (Lph)	500 (1000 max)
Cleaning chemical per CIP10% Hypochlorite (mL)	40
Citric Acid Powder (g)	300
Approx Weight (kg)	
Dry	20
Operating	30
Crated (Transport)	25
Dimensions length x width x height ( mm)	300x300x1350



# Operating Regime

- Single PVdF hollow fibre ultrafiltration membrane
- Submerged module operated with +ve head
- Nominal controlled head of 1 m
- No screening
- Typically  $<20$  l/m<sup>2</sup>/hr
- Centrifugal agitation clean, relax and gravity flush
- No air or liquid backwash
- CEF typically weekly (monthly groundwater)

## Emergency & Sustainable Water Filtration plants for Disaster Relief and Humanitarian Aid.



# Options

1 Disaster relief

2 Emergency supply

3 Medium term potable water

**DRAFT ONLY**

## Skystation Permanent Potable Water Filtration Plant.

For villages, communities, schools, where long term drinking water is required.

Solar Power Pumping System. Comes complete with:

- Solar Panel
- Electrical control box
- Submersible pump - high grade
- Pre wired power cabling
- Plumbing pipes & connectors
- Electronic float switch
- float control ball valve
- Expandable with multiple core SKYhydrants delivering up to 50,000 litres per day capacity.

### Skystation -

combines all these items as shown into one package providing a completely self contained autonomously powered, water treatment plant for remote locations where infrastructure does not exist, with up to 50,000 litres per day capacity

### Tank stand.

Comes as a flat pack & bolts together on site in 23 minutes, accommodates two 1,000 litre water tanks (not supplies)

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“Water for Every Child”  
For full details contact [www.skyjuice.com.au](http://www.skyjuice.com.au)

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swamp, creek, river, dam, well

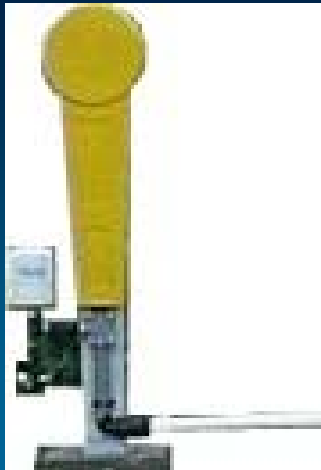
submersible pump

power supply line

water pipe

Skyhydrant Water Filter - Fixed unit. 15 kg, producing 10,000 min / 20,000 max litres per day from each core module.

# Supplied in kit form as required or joint initiative to supply from China





## SkyJuice brings safe water to thousands.

How the SkyJuice water filtration system is using the latest in proven micro technology to remove water borne diseases (including viruses) & other contaminants greater than 0.1 micron making safe drinking water for thousands in humanitarian operations.



**Community water plant** located in southern Sri Lanka uses two Skyhydrants to supply clean drinking water to the local community



**Zero plate count in India**  
Drinking water is produced from the Ganges River in India where coliform readings of 79,000cfu/100ml were reduced to zero cfu/100ml after filtration through the skyhydrant. This equates to a log 6 removal compared to a log 1-2 for sand filtration.



From this to this



Using the Skyhydrant water filter.

### 525 people now safe

Another Skyhydrant for World vision at Kalawankerny Vivekananda in Sri Lanka where 95 families totalling 525 people now have safe drinking water.



### Bulk water supply plant

Operated by Oxfam at Ampara in Sri Lanka. Poor quality river water is filtered through inline Skyhydrants to road tankers supplying drinking water to thousands of displaced persons living in local IDC camps after the tsunami.



### Skyhydrant Water Filter.

The Skyhydrant water filter unit forms the basis of numerous configurations that can be utilised to produce pure clean drinking water for humanitarian needs in a variety of situations. This freestanding model (pictured), with retractable legs, is transportable for field operations and is capable of supplying over 10,000 litres of drinking water each day.



### Health clinic rests easy

The 300 staff & patients at the Vavuniya unit 2 health care clinic in Sri Lanka now enjoy piece of mind with disease free drinking water thanks to the Skyhydrant water filter.



### Solar water plant for Aceh

An automated solar pumping system integrated with a Skyhydrant filter supplies clean drinking water all year long to the Ujong Tanjong School in Aceh Indonesia from a contaminated well (pictured).



### Clean drinking water for tanks

Water pumped from a local contaminated stream to the elevated header tank, is then gravity feed down through the 2 Skyhydrant filters (pictured) to produce clean drinking water in the 2 lower tanks for the people of Batticaloa in Sri Lanka.

### Sennigeema

Located in southern Sri Lanka and home to the Rainbow Children's Centre where safe clean drinking water is now available to the school children & their local community thanks to the team from Australia who have installed a Skyhydrant water filter into the existing water tank supply system.



# Installations



# OXFAM - Refugee (IDP) camp Ampara, Sri Lanka



Bulk water supply

100,000 L/Day

5000 person facility

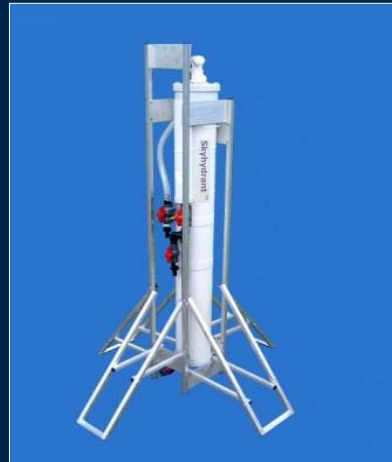
Operation 15 months

Feed turbidity 30-50 NTU

Average unit output 12kl/Day

Monthly CIP/8 hr Flush

# Typical performance



**Treated surface water would comply with WHO standards. Output of the system will be somewhat site dependent.. Assuming surface feed waters with high turbidity (300 NTU +), high suspended solids (500 mg/l +) and high bacterial & algal loadings ( $>10^6$  cfu) performance will normally be:**

<b>Colour</b>	<b>usually <math>&lt; 10</math> Pt Co units</b>
<b>Suspended solids</b>	<b><math>&lt; 0.1</math> mg/L</b>
<b>Turbidity</b>	<b><math>&lt; 0.1</math> NTU</b>
<b>Giardia Lamblia cysts removal</b>	<b><math>&gt; \text{Log } 4</math></b>
<b>Cryptosporidium Oocysts</b>	<b><math>&gt; \text{Log } 4</math></b>
<b>Bacterial loads</b>	<b><math>&lt; 10</math> cfu /100 ml</b>
<b>Algae</b>	<b><math>&lt; 1</math> cell /ml</b>
<b>Colloidal iron</b>	<b><math>&lt; 0.03</math> mg/L</b>

**SKYstation installed at  
Ujong Tanjong community  
School Meulaboh, Bandeh Aceh**

# SKYstation Sustainable solar plants




- <> Solar powered
- <> Gravity feed
- <> Manual operation
- <> 10 year min life
- <> Kit form
- <> Less than \$1 PPPA

# The economics of low cost water

- ◆ Collapsible approx 25kg plus box
- ◆ Self contained water treatment unit
- ◆ Supply say 500-1000 persons per day
- ◆ Cost less than \$0.30 per person/PA  
(1 yuan per person /PA)
- ◆ 20,000 litres per day capacity (max)
- ◆ Onboard chlorination option
- ◆ Membrane barrier
- ◆ Physical disinfection
- ◆ No moving parts, pumps, chemicals
- ◆ 10 year life , no operating costs
- ◆ Lightweight and easily deployable



# Other associated issues for authorities to consider

- Ongoing monitoring and long term maintenance
  - Long term membrane fouling (inorganics)
  - Overall system integrity and biofouling
  - Social pricing of water and ownership
  - Validation and accreditation
  - Chlorination
- 

# What we can be achieved- the Clean Up Australia & SKYJUICE Tsunami Cleanwater Program

- \$500 k in cash and goods in kind donated
- Major corporate sponsors Memcor, Vinidex, Collex, Veolia and many others
- Installed in schools, IDP centres, hospitals, villages and refugee centres
- Ongoing MOU signed to supply OXFAM, World Vision, W.H.O. and others
- Ongoing post Tsunami projects
- WFD award winning project 2005
- 250 Skyhydrants units manufactured, shipped and installed in Tsunami affected countries directly by our team



# Leadership & mutual co-operation

- The need for national recognition of the interdependent nature of the issue and look at small decentralised systems
- Is it a “joint” responsibility to immediately provide resource for localised treatment of water and sanitation
- Systems must be implemented where the local people have true ownership of the treatment system
- Water must be costed as a resource and a small fee is collected to ensure ongoing support
- Immediate need for a pilot project where small systems are tested and installed in rural China and assess performance



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**Safety**  
**Sustainability**  
**Affordability**  
**Reliability**

**Skyjuice Foundation**  
**Pure water for every child**