Solution Exchange for the Disaster Management Community
Consolidated Reply

Query: Seeking expertise for handling Oil Spillage in Mumbai- Referrals, Advice.

Compiled by G Padmanabhan, Resource Person and Nupur Gupta, Research Associate
Issue Date: 22 September 2010

From Ashok P. Ghule, District Disaster Mangement Authority, Thane, Maharashtra
Posted 12 August 2010

Around 9.50 am on 8th August, Panamanian container vessel MSC Chitra, while leaving JNPT Nhava Sheva port, collided with the inbound MV Khalijia-3. This caused oil containers from MSC Chitra to fall into the Arabian Sea.

The impact of the collision was so huge that containers from MSC Chitra were hurled into the sea and oil began to leak from the vessel. Besides the oil that had rapidly spread, drums filled with pesticide and many other items also fell into the water. The coastal areas have been on high alert. Over 31 containers with hazardous chemicals are still missing. Debris can still be seen floating in the water. The water around the damaged MSC Chitra is clear but that is because the ship is in deep sea and the debris are getting washed ashore. The oil has already caused severe water pollution along the coast of Raigad and Mumbai. Latest reports say pesticide bottles have also washed up along the coast, aggravating the problem.

The District Disaster Management Authority, Thane under the chairpersonship of Thane Collector is involved in this operation including for searching the missing container. This operation is being supported by Revenue Department, Police, Maharashtra Pollution Board, Indian Coast Guard, Urban Local Bodies & NGOs in their respective area.

In order to take effective action in searching for the missing containers, clearing the coastline and dealing with this disaster, we request members to please provide

- References of agencies involved in handling oil spillage on shore and for cleaning the coastline at Mumbai & nearby areas
- Suggest measures to clean up the oil spill from coastal areas and handle its impact on the marine eco-system
• Suggest mitigation and preparedness strategies for managing this type of incidence in the future

We will contact the agencies suggested by you for immediate action and based on your suggestions work on a longer term mitigation and Preparedness strategy for Oil Spillage off shore.

Looking forward to a quick response.

Responses were received, with thanks, from

1. Arun Patre, India Water Portal Team, Bangalore
2. Seema Verma, RBS, Mumbai
3. Alok Sharma, UNICEF, New Delhi
4. Deepa Prabhu, Knowledge Solutions, Mumbai
5. Banwari Lal, Environmental and Industrial Biotechnology Division, The Energy and Resources Institute, New Delhi
6. Madhukar Sanap, Municipal Corporation Greater Mumbai (MCGM), Mumbai
7. E.Karthikeyan, Envis Center, Faculty of Marine Science, Annamalai University
8. Naresh Sharma, Eco Friends, Jalandhar
9. Tushita Mukherjee, GTZ India, New Delhi
10. Suresh Kumar S, National Institute for Interdisciplinary Science and Technology, Trivandrum
11. Uday Bhawalkar, Bhawalkar Ecological research Institute (BERI), Pune
12. Nitin Ainapure, Telelink Communications, Kolahpur, Maharashtra
13. M Jahangir, Fresh Water Action Network-Pakistan (FANSA-Pak), Islamabad
14. Prasoon Shukla, Dr. Brijendra Swaroop (P.G.) College, Kanpur
15. Ajit Seshadri, The Vigyan Vijay Foundation, New Delhi (Response 1, Response 2)
16. Gautam D Oza, GMR Group, Bangalore
17. S.C. Mohanty, Government of India- UNDP Disaster Risk Reduction Programme, Mumbai

Further contributions are welcome!

Summary of Responses

Related Resources

Responses in Full

Summary of Responses

The query seeking expertise for handling Oil Spillage in Mumbai received member sending in a surge of responses.

Suggesting measures to clean up the oil spill from coastal areas and handle its impact on the marine eco-system, members informed that some countries have developed oil eating bacteria which can be used to clean up oil spills in sea. Members also shared details of other technologies such as;

• Oil Reporter crowd sourcing app' that can also be used to share real time information in case of disasters. This application essentially provides the opportunity for having virtual volunteers
to review images of affected areas and map data elements such as perimeters of oil presence and injured wildlife in remote areas where physical assessment access is limited.

- **Oilzapper (bacterial consortia)** that can degrade the toxic petroleum hydrocarbons of oil spills and oily sludge generated by oil refineries to biological compost. This is a cost effective and environment friendly method that is acknowledged by both oil corporate as well as pollution control agencies for mitigating environmental problems of the oil industry.

- **Bioremediation or Biodegradation** - a system of using microorganisms to break down some toxic hydrocarbons present in crude oil into less harmful compounds.

- **BioSanitizer Ecochips** - These chips can be put into use as soon as disasters are noticed. They trigger high-speed reactions that convert pollution into resources, without use of machinery, trained manpower or electricity.

- **Echo Sounder (Sonar) Or Good Quality Fish Finder system along with GPS SYSTEM** - This will help to locate and mark their position (Latitudinal/Longitudinal). This information is very useful for removal of containers & to prevent further accidents because of container.

Apart from the above, discussants shared responses for various types of oil spill conditions. The table below details out the methods, their advantages and disadvantages.

<table>
<thead>
<tr>
<th>Response Methods</th>
<th>Oiling Condition</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural Recovery</strong> (allow the oil to degrade in place or be removed by tidal and wave action)</td>
<td>Lightly or very lightly oiled marshes</td>
<td>Minimal impact, avoids physical disturbance from cleanup actions; studies have shown rapid recovery.</td>
<td>Potential oiling of birds or wildlife using the marsh during the time it takes the oil to be removed.</td>
</tr>
<tr>
<td><strong>Vacuuming/Skimming</strong> (mostly conducted from boats, in conjunction with flushing to increase recovery rates)</td>
<td>Moderately or heavily oiled marshes</td>
<td>Removes large quantities of oil from the marsh; bulk oil removal will speed natural recovery of remaining oil.</td>
<td>Difficult to bring equipment into marsh without causing some impacts such as crushing of vegetation; impacts may be considerable if not conducted properly. Only very shallow-drafted vessels would be able to access some marsh areas. Collected oil and water must be transported and stored.</td>
</tr>
<tr>
<td><strong>Low-pressure Flushing</strong> (with water comparable to marsh type, or near water source)</td>
<td>Moderately or heavily oiled marshes</td>
<td>Can assist in oil removal by herding oil to collection points (used with vacuuming/skimming); lifts oil off sediment surface (when marsh is not flooded).</td>
<td>Pressure must be carefully controlled to prevent eroding the marsh soils (erosion would expose vulnerable rhizomes). Must be carefully monitored; can cause physical impacts during placement of hoses and pumps. Can be difficult to achieve without removing above-ground vegetation. Can be difficult to flush oil in desired seaward direction without penetrating into marsh, but foot traffic on oiled marsh greatly compromises recovery prospects. May wash away loose soils exposing roots and making them susceptible to further oiling in tidal areas.</td>
</tr>
<tr>
<td><strong>Manual Removal</strong> (by hand or mechanized equipment)</td>
<td>Moderately or heavily oiled marshes</td>
<td>Can be best way to access pooled oil in the marsh interior, using boardwalks to minimize soil disturbance.</td>
<td>Can result in significant damages to the marsh, including soil compaction. Very slow, with challenging logistics for waste management.</td>
</tr>
<tr>
<td>Natural Sorbent Materials</td>
<td>Technique A: Shredded sorbents applied to oiled marsh shorelines (including bagasse, hay, rice hulls, and cotton lint)</td>
<td>Shoreline application of sorbents in strips (2 inches deep by 4-6 feet wide) can prevent further penetration of oil into the interior portions of marsh areas. Low impact on marsh vegetation and soils, as sorbents are applied from shallow-draft boats with blowers onto oiled shoreline areas. Natural materials absorb oil off vegetation and from contaminated soil. Sorbents provide substrate for in situ microbes to attenuate oil, speeding the rate of oil degradation. Sorbent materials will also biodegrade quickly. Reduces risk of residual oil to wildlife from both contact with oiled vegetation and released sheens.</td>
<td>Recovery of loose sorbents is not likely, so use is not appropriate in areas with lots of free-floating bulk oil. Loose materials may be eroded by wave and tidal action from marsh fringe, where the oil is most likely to strand. Limited prior use and wide-scale application or information on effectiveness. Heavily oiled material could be more persistent. Loose natural sorbents may contain residual pesticides and should be tested.</td>
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<tr>
<td>Natural Sorbent Materials</td>
<td>Technique B: Shredded sorbents applied to unoiled marsh shorelines at imminent risk of oiling (including bagasse, hay, rice hulls, and cotton lint)</td>
<td>Pretreatment prior to oiling may prevent damage to shoreline vegetation and soils. Shoreline application of sorbents in strips (2 inches deep by 4-6 feet wide) can prevent further penetration of oil into the interior portions of marsh areas. Applied with minimal physical disturbance (by blower from shallow-draft boats). Sorbents provide substrate for natural microbes to attenuate oil, speeding the rate of oil degradation. Sorbent materials will also biodegrade quickly. Reduces risk of residual oil to wildlife from both contact with oiled vegetation and released sheens. Available in large quantities at low cost</td>
<td>Loose materials may be eroded by wave and tidal action from marsh fringe, where the oil is most likely to strand. Limited prior use and wide-scale application or information on effectiveness. If removed after oiling, increases the total amount of material to be removed. Oiled material will be transported to other areas. Heavily oiled material could be more persistent. Oiled materials that disperse into open water may sink. Loose natural sorbents may contain residual pesticides and should be tested.</td>
</tr>
<tr>
<td>Natural Sorbent Materials</td>
<td>Technique C: Sorbents in booms to clean off-shore waters (materials contained, such as in a sausage boom, snare, and sweep)</td>
<td>Potentially all oiling conditions</td>
<td>After oiling, easier to dispose of and breakdown. Recovers oil as it is being released from the marsh; used mostly along the outer marsh fringe, so no vegetation disturbance if properly deployed.</td>
</tr>
</tbody>
</table>
| In-situ Burning | Heavily oiled marshes, with large amounts of free-floating oil trapped in the vegetation. Best suited for marsh in intertidal zone, when water covers sediment surface. | Can remove oil quickly; can minimize impacts from other physical removal methods; conditions of appropriate use are known; only considered once the source is controlled because of the risk of re-oiling. | Burning is a high risk technique. Burning can remove a substantial portion of oil, but does not remove all of it. Recovery of burned oil residue may be necessary for the in-situ burn option which could cause compaction, if done on foot. Any residue that forms may also refloat and be carried to other areas, perhaps beaching and requiring recovery. Localized air quality concerns for workers and communities; impacts to birds and wildlife in the burned area; may be difficult to control burn. Burning in areas not covered by water can cause some heated oil to penetrate into sediment. Elevated soil temperatures can destroy rhizomes needed for recovery (not suitable for areas that can't be replanted). Burning in summer or fall is contrary to standard marsh management practice in Louisiana (burning is done in winter when vegetation is dormant). Replanting with plants tall enough that leaves reach above high tide level may facilitate recovery.

| Vegetation Cutting | Moderately or heavily oiled marshes | Increases the recovery rate for pooled oil in otherwise inaccessible interior marshes; has been conducted successfully in roseau cane habitats in the Delta NWR, under close supervision. For most other marsh types, only consider cutting once the spill source is controlled because of the risk of re-oiling. | Cut vegetation may die, particularly if re-oiled or if water levels increase greatly after cutting. Can be difficult to avoid risk of foot traffic mixing oil deeper into sediment. May increase rate of marsh loss. Must be carefully monitored. Difficult to remove large volumes of cut vegetation. Cutting plants without foot traffic in oiled marsh is difficult, and walking on oiled marsh will mix surface oil into the sediment, compromising the potential for recovery. If re-oiling of the area occurs as plants regrow, death of plants and their roots, as well as loss of organic substrate, can be increased.

| Surface Washing Agents | Where the entire above-ground vegetation is heavily oiled | May increase vegetation survival and reduce contact hazards to wildlife; consider only those products shown to be non-toxic to plants. | Becomes less effective as the oil weathers, therefore, likely a narrow window of opportunity. Requires extensive logistics. Application to interior marshes by foot may result in physical damage to the marsh.

| Bioremediation (addition of amendments such as N, P, or oxygen where they are found to be limiting natural growth) | Mostly as a secondary treatment after bulk oil removal | The spilled oil is highly biodegradable, thus could proceed quickly and with minimal residuals. | Lots of uncertainty as to what factors may be limiting natural degradation rates, and how to effectively overcome them. Oxygen, rather than nutrients, will be the most limiting in marshes; however, there are no proven methods to add oxygen to muddy, water-saturated marsh soils.

Suggesting response strategies for managing this type of incidence, members outlined the following:
- Considering oil- sludge deposits as resources and using it locally, or to encase them in good sealed containers, for use in communities.
Carrying out a factual Assessment of Environmental Elements in this affected Eco-system (quantity and quality basis) including the impact of the oil spill. To complete the audit of the Nature's assets, compare a region which has not been affected with the listed features.

Diverting sludge to easy working locations by first observing the way of nature, of tides, and ocean- winds and then by making dedicated channels to guide accumulations to some specific locations. This would make the working practices more systemized where working communities can tackle it easily.

Discussants opined that once the oil/ sludge is fixed in the bio- material, it's important to dispose or transport it off site. This bio- waste material- dried and caked can be used for local home-kitchens and can be kept stored for future use. They recommended using this as financial reward to the communities who participate in the clean-up operation. Considering all factors and impacts use of this oily sludge as energy for home- cooking to be considered and the ashes etc to be tested and taken for safe disposal.

Members also shared several references of agencies involved in handling oil spillage on shore and for cleaning the coastline at Mumbai & nearby areas. For future reference, members suggested listing biotechnology/ microbiology research institute or universities who can together with some industry can help for such interventions.

Members outlined that the spill-out of oil in marine- environment such as in Mumbai coast was a very complex one. The very nature and its pristine elements have all got affected and would require considerable efforts and time by way of labour, tools that can be managed locally, and specific consultations etc

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**Related Resources**

**Recommended Documentation**

**Oil-eating bacteria cleaning China oil spill**  *(from Alok Sharma, UNICEF, New Delhi)*

Article; by The Times of India News paper; New Delhi; 20 July 2010 ; Available at [http://timesofindia.indiatimes.com/articleshow/6192499.cms](http://timesofindia.indiatimes.com/articleshow/6192499.cms)

*Article on how 23 tonnes of oil-eating bacteria were used to clean up an oil spill off the coast of northeast China's Dalian City.*

*From Madhukar Sanap, Municipal Corporation Greater Mumbai (MCGM), Mumbai*

**Cleanup Procedures Oil Spills**

Article; by Katy Lindamood, eHow


*The article describes basic procedures for oil spills in water and on shore.*

**The State of Oil Spill Cleaning Technology**

Article; by Joe Hasler; Popular Mechanics;


*Article provides an overview of the cleanup technologies for the Deepwater Horizon spill.*

**Spill Response Strategies For Oil Spill Cleanup**

Article; by Dawg;

The article details out various strategies for Selecting Oil Spill Response Methods based on environmental consequences of the spill and the response

Redneck Oil Cleanup (from Naresh Sharma, Eco Friends, Jalandhar)
Video; by E Baum's World; Available at http://www.ebaumsworld.com/video/watch/80991607/
The video shows cleaning of oil spill by a unique and cost effective method, simple by hay.

Petroleum Biodegradation in Marine Environments (from Suresh Kumar. S, National Institute for Interdisciplinary Science and Technology, Trivandrum)
Paper; by Shigeaki Harayama, Hideo Kishira, Yuki Kasai and Kazuaki Shutsubo; Marine Biotechnology Institute; Japan
Available at http://www.horizonpress.com/jmmb/v1/v1n1/10.pdf (Pdf 165 KB)
The paper talks about bioaugmentation or seeding as a useful method to enhance the cleanup process of oil-contaminated sediment.

From Gautam D Oza, GMR Group, Bangalore

Chinese use bacteria to clean up oil spill
Article; by PRESSTV; July 2010; Available at http://edition.presstv.ir/detail/135575.html
Article informs that Chinese officials used more than 23 tons of oil-eating bacteria to clean up the spill from the exploded pipelines in the northeast coast of Dalian City.

What You Need to Know About Bioremediation of Oil Spills
Article; by Oilism.com; July 2010; Available at http://www.oilism.com/oil/2010/07/07/what-you-need-to-know-about-bioremediation-of-oil-spills/
Article takes a closer Look at Bioremediation as a method to tackle oil spill.

Using microbes to clean up oil spills
Video; by Houstuffworks.com; Available at http://blogs.howstuffworks.com/2010/06/03/using-microbes-to-clean-up-oil-spills/
It demonstrates the use of microbes in Texas to clean up oil floating on the ocean as well as oil that has contaminated marshes and wetlands.

China uses oil-eating bacteria in oil spill cleanup
Article; by World Countries Available at http://coastalcare.org/2010/07/china-uses-oil-eating-bacteria-in-oil-spill-cleanup/
Shares how China used oil-eating bacteria to clean up the oil spill off the coast of northeast China’s Dalian City.

From Nupur Gupta, Research Associate

Safe Handling of Oil and Chemicals
Report; Alaska Department of Environmental Conservation; Alaska, USA
Available at http://www.dec.state.ak.us/spar/docs/SafeHandlingBrochure3.pdf (PDF Size: 2.09 MB)
Explains how through effective prevention, preparedness and response the Spill Prevention and Response Division of Alaska Department of Environment Conservation manages oil spills.
Chemical Spillage - A Preventable Disaster?
Paper; by L. Rosenberg and U. Shabshin; Ben Gurion University of the Negev; Annual Medit. Burns Club Vol. 8 No. 3; Israel; September 1995
Consider accidents caused by spillage of dangerous chemicals and their possible prevention, citing experience in Israel and of findings of researchers across the world

Recommended Contacts and Experts

Dr. T. Balasubramanian, Faculty of Marine Science, Annamalai University, Tamil Nadu
(from E.Karthikeyan, Envis Center, Faculty of Marine Science, Annamalai University)
Parangipettai - 608 502, Tamil Nadu, India; Tel: +91-4144-243223; 243533;243070; 243071; Fax: +91-4144-243555; casmb@envis.nic.in, cdl_aucasm@sancharnet.in, stbcas@nic.in; http://casmbenvis.nic.in
Has done research on Oil Pollution -Monitoring, Survey in the Coastal Environment Impact assessment, Toxicity study on the Marine Organisms and Environmental Management plans

Prof. AL Ramanathan, Jawahar Lal University, New Delhi (from Ajit Seshadri, The Vigyan Vijay Foundation, New Delhi)
New Mehrauli Road, New Delhi 110067.; Tel: +91-11-26742676, 26742575, 26741557; Fax: 26742580; http://www.jnu.ac.in/
Has been researching on varied mangroves of different areas of Indian Coast; can be contacted for guidance

Recommended Organizations and Programmes

From Seema Verma, RBS, Mumbai

Alpha MERS Pvt Ltd, Bangalore
#13, 2nd Floor, 1st Main Road, SBM Colony, Anand Nagar, Bangalore 560024; Tel +91 (80) 23542870; Fax +91 (80) 23337870 sekhar@alphamers.com; http://www.alphamers.com/;
An Oil spill response organisation providing risk assessment services and on-site and off-site equipment inventory and the support required in the aftermath of an oilspill.

Clean Sea Enterprises, Mumbai
D-440, IInd Floor, Vashi Plaza, Sector-17, Vashi Navi Mumbai-400 703; Tel: +91 22 2765 7811, 4013 5610, 4514 5610; Fax: +91 22 2765 0963; info@cleanseaent.com; http://www.cleanseaent.com;
Pioneer in the field of Marine Environment since 1999; has got varied experiences from Navy, Coast Guard, Merchant Shipping and General administration.

KEI-RSOS Maritime Ltd, Hyderabad
10 – 3 – 316 A, Masab Tank, Hyderabad - 500 028, Andhra Pradesh; Tel: 4023346521; Fax: 4023348300
Is a port operations and management services provider; also provides Oil field support services and marine operations.

Zorbit Technologies, Mumbai
Nerul, Navi Mumbai 400706; Tel: + 91 227709945, + 91 9820291867;
Zorbit Technologies Inc. is the leading producer of a 100% natural, environmentally safe hydrocarbon absorbent
(from **Alok Sharma**, UNICEF, New Delhi)

**Portable Instant Water Filter “NEERI-ZAR”**

Contact: National Environmental Engineering Research Institute (NEERI), **Nagpur**
Nehru Marg, Nagpur, 440020 Maharashtra; Tel: 91-712-2249885-88; Fax: 91-712-2249900; ra_sohony@neeri.res.in

Provides onsite treatment to remove organic contamination, suspended solids and bacteria

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**Indian Oil Corporation Limited, Faridabad**
R&D Centre, Sector 13, Faridabad 121007; Tel: 91-129-2294637, 2290336; Fax: 91-129-2286221
ker@iocl.co.in; [http://www.iocl.com/services/ResearchDevelopment.aspx](http://www.iocl.com/services/ResearchDevelopment.aspx);

Carries out research on lubricants technology, refining process, pipeline transportation, bio-fuels and fuel-efficient appliances.

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**Oil and Natural Gas Corporation (ONGC), Mumbai**

Leading Gas Exploration & Production (E&P) Company from India; can be contacted for guidance for handling the oil spill

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**The Energy and Resources Institute (TERI), New Delhi** (from **Banwari Lal**, Environmental and Industrial Biotechnology Division, The Energy and Resources Institute, New Delhi)
Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi - 110 003; Tel: 2468 2100 and 41504900; [http://www.teriin.org/](http://www.teriin.org/);

Has carried out bioremediation of oil spill sites and residual oily sludge in all the major oil installations and refineries in India and has treated oily sludge /oil contaminated soil.

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**Maharashtra State Pollution Control Board (MSPCB), Mumbai** (from **S.C. Mohanty**, Government of India- UNDP Disaster Risk Reduction Programme, Mumbai)
Kalpataru Point, 3rd and 4th floor, Opp. Cine Planet, Sion Circle, Mumbai-400 022.; Tel: 022-24020781 / 24014701 / 24010437; Fax: 022-24024068; enquiry@mpcb.gov.in; [http://mpcb.gov.in/](http://mpcb.gov.in/);

The lead agency in regard to oil pollution ashore and actively worked during the oil spill in Mumbai

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**Recommended Communities and Networks**

**Crisis Commons**, (from **Deepa Prabhu**, Knowledge Solutions, Mumbai)
http://wiki.crisiscommons.org/wiki/Oil_Spill_Response; info AT crisiscommons.org, Contact Noel Dickover, Co-Founder; ndickover AT gmail.com

The Global network brings together communities who innovate crisis response and global development through technology tools, expertise and problem solving.

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**Recommended Tools and Technologies**

**Oil Reporter** (from **Deepa Prabhu**, Knowledge Solutions, Mumbai)
Application; Owned by Interidea, Crises Commons, Appcelerator
Available at [http://oilreporter.org/](http://oilreporter.org/)

Oil Reporter enables people to help with the recovery effort by using real-time check-ins to report what they're seeing on the ground.
Oilzapper (bacterial consortia) (from Banwari Lal, Environmental and Industrial Biotechnology Division, The Energy and Resources Institute, New Delhi) Technology; Owned by The Energy and Resources Institute, New Delhi. Available at http://www.teriin.org/index.php?option=com_content&task=view&id=46

Oilzapper can degrade the toxic petroleum hydrocarbons of oil spills and oily sludge generated by oil refineries to biological compost.

Biosanitizer (from Uday Bhawalkar, Bhawalkar Ecological research Institute (BERI), Pune) Tool; Owned by Bhawalkar Ecological Research Institute, Pune. Available at http://www.wastetohealth.com/biosanitizer_ecosanitation_resource.html

A naturally produced catalyst that continues to produce need-based amount of active oxygen and drives eco-logical reactions that clean polluted water.

Related Consolidated Replies

Handling Industrial and Chemical Disasters, from Amit Tuteja, Tata Chemicals, Barbala (Experiences; Examples) Disaster Management Community. Issued 30 June 2007. Available at: http://www.solutionexchange-un.net.in/drm/cr/cr-se-drm-02060701.pdf (Size: 113 KB)

Shares experiences and tools & technologies for effective handling of Industrial and Chemical disasters, also highlights role of private and non government organisations in promoting it.

Responses in Full

Arun Patre, India Water Portal Team, Bangalore

The Schools India Water Portal had covered the Children's Science Congress where one student has used the simple tool - aluminium plate to tackle oilspills.

Please watch the video to assess the feasibility of using this technique - http://www.youtube.com/watch?v=quhZtLE8Ric

Seema Verma, RBS, Mumbai

Following agencies listed in India for Oil clean -up.

You may like to visit this website for more details/help.
http://www.cleanupoil.com/equipment.htm

Alpha MERS Pvt Ltd
Bangalore 560024
Tel +91 (80) 23542870
Fax +91 (80) 23337870
http://www.alphamers.com/

Clean Sea Enterprises
Vashi, Navi Mumbai
Tel +91 (22) 2765 7811
Fax +91 (22) 2765 0963
http://www.cleanseaent.com/
Marine oil spill responses & related services

KEI-RSOS Maritime Ltd
Tamil Nadu 609 311
Tel +91 (4364) 288547
Fax +91 (4362) 288751

Zorbit Technologies (India)
Nerul, Navi Mumbai 400706
Tel +91 227709945
Tel +91 9820291867

Alok Sharma, UNICEF, New Delhi
It was an unfortunate incident, which has been happening all parts of world and we are now considering solution or preparedness on this kind of man made disaster. There have been reports in media and various websites that some companies have developed oil eating bacteria to clean up the mess created in sea. China has done it very recently, if we believe the report from Times of India. To read the article click here.

Some bacteria literally 'live on oil,' just as some people live on meat and potatoes. And they consume it with just as much relish. After the major oil spill in Alaska's Prince William Sound, the Environmental Protection Agency brought in natural oil-eating bacteria to help clean up the mess. The follow-up studies suggest that the microbes did as good a job in cleaning up soiled beaches as high-pressure hoses and detergents could have done. The NDMA should immediately formulate plan to keep such biotechnology/ microbiology research institute or universities in the list who can together with some industry can rise to such an occasion (experts from department of Biotechnology and Environment should be put in the resource pool). For current situation I guess National Disaster Management Authority and or Jawaharlal Nehru Port Trust must have been approached by such companies who have demonstrated capabilities of producing such bacteria and can control the damage further. Alternatively ready-made solution can be searched with NEERI, Nagpur and Indian Oil Ltd. who has a R&D centre at Faridabad.

Deepa Prabhu, Knowledge Solutions, Mumbai
Q: Suggest measures to clean up the oil spill from coastal areas and handle its impact on the marine eco-system and for suggest mitigation and preparedness strategies for managing this type of incidence in the future or preparedness strategy for Oil Spillage off shore.

1. There is considerable activity and work done in this regard more details of which are available at:

http://wiki.crisiscommons.org/wiki/Oil_Spill_Response

2. Oil Reporter crowd sourcing app’ is one application that can also be used in other disaster management cases too.

Start Quote : from site as follows;” Oil Reporter is a pretty simple idea. We want people to share what they see and to allow that information to be shared with everyone. We believe that if people share what they see and that information can be placed on a map, it can help organizations and communities with their response efforts.
Oil Reporter is available here as well as from the Apple App Store and the Google Android App Store. Data from these mobile applications will be stored by San Diego State University and provided back to the public via Oil Reporter’s open API. Oil Reporter’s Adopt-A-Beach initiative will provide the opportunity for virtual volunteers to review high resolutions imagery of the Gulf Coast and to map data elements such as perimeters of oil presence and injured wildlife in remote areas where physical assessment access is limited. This also provides an opportunity for Oil Reporter photographs and video to be joined with high resolution imagery to provide greater understanding and provide an ability to share data from these sources back to the public.

http://oilreporter.org/about"

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**Banwari Lal**, Environmental and Industrial Biotechnology Division, The Energy and Resources Institute, New Delhi

Perhaps you might be aware that TERI (The Energy and Resources Institute) has developed Oilzapper (bacterial consortia) that can degrade the toxic petroleum hydrocarbons of oil spills and oily sludge generated by oil refineries to biological compost. This is a cost effective and environment friendly method that is acknowledged by both oil corporate as well as pollution control agencies for mitigating environmental problems of the oil industry.

TERI has been doing bioremediation of oil spill sites and residual oily sludge for the past 10 years, in all the major oil installations and refineries in India. With application of Oilzapper TERI has treated 2,00,000 tonnes of oily sludge/oil contaminated soil. The technology has also been successfully demonstrated in Kuwait oil field.

We have come to know about the recent oil spill in Mumbai Coast due to collision of Chitra with Khalijia- III which was carrying 266 tonnes of fuel. We have been directed by Tatrakshak Mukhalayala, Indian Coast Guard Headquarters to approach Maharasthra State Pollution Control Board. In this regard I am visiting Mumbai tomorrow (13rd August) to visit the oil spill site and meeting with Maharasthra State Pollution Control Board.

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**Madhukar Sanap**, Municipal Corporation Greater Mumbai (MCGM), Mumbai

I am sharing a table that provides a list of potential response activities to be taken in an oiled marsh. This list is not to be construed as approval by the NRT, but rather to show potential activities that can be considered by the Incident Command. To view the table click ftp://ftp.solutionexchange.net.in/public/drm/cr/res12081001.xls

You can also refer below links for more information;
http://www.ehow.com/how-does_5136556_cleanup-procedures-oil-spills.html
http://www.dawginc.com/oil-spill-response-ar18
http://india.foreignpolicyblogs.com/tag/mumbai-oil-spill/

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**E.Karthikeyan**, Envis Center, Faculty of Marine Science, Annamalai University

Faculty of Marine Science, Annamalai University, Parangipettai, Tamilnadu is doing research on Oil Pollution Monitoring, Oil Pollution Survey in the Coastal Environment, Oil Pollution Impact assessment, Oil Pollution Toxicity study on the Marine Organisms and Environmental Management plan preparations. Hence you can contact for further studies of the same.
Naresh Sharma, Eco Friends, Jalandhar

Please follow this link to see the video of cleaning of oil spill by a unique and cost effective method, simple by hay.
http://www.ebaumsworld.com/video/watch/80991607/

Tushita Mukherjee, GTZ India, New Delhi

You can contact The Energy and Resources Institute (TERI) (Dr. Banwari Lal, Director) who have developed a bug that cleans oil spills with Oil and Natural Gas Corporation (ONGC). It’s very effective and is called 'oilzapper'.

Suresh Kumar, National Institute for Interdisciplinary Science and Technology, Trivandrum

What about bioremediation or biodegradation? - a large number of bacteria/fungi have been identified that can do the job, though the marine environment is challenging. These are:

Achromobacter, Acinetobacter, Actinomyces, Aeromonas, Alcaligenes, Arthrobacter, Bacillus, Beneckea, Brevebacterium, Coryneforms, Erwina, Flavobacterium, Klebsiella, Lactobacillus, Leumthrix, Moraxella, Nocardia, Peptococcus, Pseudomonas, Sarcina, Sphingobacterium, Spirillum, Streptomyces, Vibrio, Xanthomyces, Fungi, Allescheria, Aspergillus, Aureobasidium, Botrytis, Candida, Cephalosporium, Cladosporium, Cunninghamella, Debaromyces, Fusarium, Gonytrichum, Hansenula, Helminthosporium, Mucor, Oidiodendrums, Paecilomyces, Phialophora, Penicillium, Rhodospiridium, Rhodotorula, Saccharomyces, Saccharomycopsis, Scopulariopsis, Sporobolomyces, Torulopsis, Trichoderma, Trichosporon,


Uday Bhawalkar, Bhawalkar Ecological research Institute (BERI), Pune

I am forwarding my letter to CM (of Maharashtra) and the PM (of India), pasted below. It will bring some emerging issues on board.

Hon’ble Prime Minister of India
Hon’ble Chief Minister of Maharashtra
Dear Sirs,

Sub: Advanced High-speed Broadband Disaster Management, using BioSanitizer Ecochips

Our country is facing diverse challenges that arise out of spillage of resources and create pollution.

Even the so-called natural calamities, too, are due to human interference that causes spillage of resources.

This spillage causes drain on our economy and conventional fire-fighting puts more drain.

We have developed a modern technique, that of BioSanitizer Ecochips.

These chips can be put into use as soon as disasters are noticed. They trigger high-speed reactions that convert pollution into resources, without use of machinery, trained manpower or electricity.

Mumbai Oil Spill:

- Involves cocktail of pollution due to crude oil, lube oil, diesel and hazardous chemicals.
- Current approach of spraying additional chemicals is too crude.
- BioSanitizer Ecochips are working near the southmost peak of Mumbai, where the BioSanitizer-treated sewage is cracking the toxic soup in the sea.
- We can invest in BioSanitizer Ecochips, to speed up this reaction.
- We suggest first dose of about Rs 50 lakh.
- After about 1 week, we will be able to judge the scope of the crisis and recommend next dose, so as to achieve effective clean-up in a reasonable time span.
- This clean-up helps local ecology by converting pollution into oxygen that helps increase seafood production.
- This clean-up operation will also clean up Mumbai's air pollution and reduce malaria and other epidemics that are there in Mumbai.
- This technology was used to manage Mumbai's July 26, 2005 deluge.
- We can show USA and other advanced countries, how India can manage such disasters using Nature-inspired technology. Gulf oil spillage and toxic air in Moscow (where 700 people are dying each day) are awaiting effective remedy.

With best regards,

Nitin Ainapure, Telelink Communications, Kolahpur, Maharashtra

This is with reference to your mail regarding recent disaster on 8th August in Mumbai at JNPT Port. As you said there are over 31 containers with Pesticides & Hazardous chemicals are still missing. Assuming that those missing containers are sunk in Arabian sea, to handle its impact on the Marine echo system as well as activity's in JNPT Port. My suggestion is use of ECHO SOUNDER (SONAR) OR GOOD QUALITY FISH FINDER system along with GPS SYSTEM. This will help to locate and mark their position (Latitudinal/Longitudinal). That information is very use full for removal of containers & to prevent further accidents because of container.

M Jahangir, Fresh Water Action Network-Pakistan (FANSA-Pak), Islamabad

The idea mentioned in Arum Patre’s response is great. Though the basis of collection like Aluminum Oxide and/or surface tension remain to be explored. Looks it works. Increasing the plate size and number of plates (A Battery of many), can be considered. It sounds bubbling with
potential to be a break through. Your have our best wishes for the proto type development and subsequent applications

Prasoon Shukla, Dr. Brijendra Swaroop (P.G.) College, Kanpur
The video shared by Arun Patre it could be a very helpful scheme for oil spills.

Ajit Seshadri, The Vigyan Vijay Foundation, New Delhi (Response 1)
This indeed has been a very interesting issue and our community is deliberating on it.

The spill-out of oil in marine- environment such as in Mumbai coast is a very complex one. The very nature and its pristine elements have all got affected and would require considerable efforts and time by way of labour, tools that can be managed locally, and specific consultations etc.

I have been following the news on NDTV- and must say that it’s definitely encouraging that The Energy and Research Institute Team led by able scientists Dr. Banwari Lal and others, are coming in to carry out work at this difficult location. We wish them well for their steadfast efforts.

Some suggestions

Once the oil/ sludge is fixed in the bio- material, it’s important to dispose/ transport it off site. This bio- waste material- dried and caked can be used for local home- kitchens and can be kept stored for future use. This can also act as financial reward to the communities who participate in the clean-up operation. Considering all factors and impacts use of this oily sludge as energy for home- cooking to be considered and the ashes etc to be tested and taken for safe disposal.

An example

In this context, I wish to bring to members notice an incidence of oil-spill which occurred in my ship while we were bunkering- (re-fuelling procedure on ships), the amount of oil spilled was not much it was around 4.0 Metric tons, which is 4500 liters, but spread on a surface area of 0.5 sq km -- this thin film of Light Fuel oil posed an ugly sight, and caused a lot of embarrassment and could invite heavy fines.

The spill occurred in the midnight hours at 2 AM. But a pleasant offer came from our local shipping agent, that commencing day- break, he would get around 50 locals of them and try skimming the oil layer from the surface and on to big utensils. And then again after oil settles in these big utensils to be again skimmed out and taken in 200 Liters drums for local consumption etc.

All this required labour and efforts. This was indeed a crude experiment to start with but after some testing the team leader formed some organised practices to sui the situation at site. Floater- booms, long handled scoops, one man ferried rubber- floats etc were deployed to push the oil film in the direction of the wind, and also the current of the tide to one portion of the bay in the Vizag harbour.

The complete cleanup took around 4 days and some finishing work for a day, and all these efforts in way of labour, material, and at the last localised battery operated pumps were used to skim out the last remains of the oil- water- sludge and its layers on surface of the basin.

In this case the conditions were more favorable and presented some hurdles that could be handled.
The main lesson we learnt was the oil which got retrieved was no doubt had water and unclean presence, but still were taken by the labour communities. This reward encouraged the labour to work with more intent and they also took their daily labour wages for 2 shift work. On the whole, this happened to be a good community participation, which was well appreciated.

"Seeking expertise for handling Oil Spillage in Mumbai"

1. Use of oil sludge locally if prudent:
   In this case also, the main Team incharge of the clean-up is suggested to work on utilisation of the oil sludge deposits as far as possible locally, or to encase them in good sealed containers, for use in communities. If the wasted oily residues, are considered as resources, it would be ideal this aspect to be assessed by the Team.

2. Audit of All Environmental Elements:
   Next thing to do would be to carry out a factual Assessment of Environmental Elements in this affected Eco-system (quantity and quality basis). At each location, list out the elements which have comprised this marine eco system, however small it would be, say mangroves, foliage on surface, land rocks-soil at low-tide, high tide, aqua marine features, ambient air quality, presence of any toxics or its only petroleum in nature, how the fishes, that have perished etc. Please list them, they give a tell tale information, what is the reason of their death. To complete the audit of the Nature's assets, compare a region which has not been affected with the listed features.

3. For diversion of sludge to easy working locations:
   A good observation is required -by way of nature, by currents, behavior of tides, and ocean winds are the oily deposits getting lodged in some core areas of the coast, then by making some dedicated channels. All these accumulations can be guided to be concentrated in some specific locations. This would make the working practices more systemized where working communities can tackle it easily.

4. Pool of experts on specific subjects for consultation:
   At Jawahar Lal Nehru University, Delhi Prof. AL Ramanathan has been researching on varied mangroves of different areas of Indian Coast. Please contact him for any guidance.

These are a few inferences, I have jotted down and give to the team members.

We wish them, all the best for their steadfast efforts, and painstaking efforts.

Gautam D Oza, GMR Group, Bangalore

I completely agree with Mr. Suresh Kumar suggestion. Here are few articles of 2010 were Bacteria has come to rescue for oil spills:


Hope this helps.
I am sharing with you my experience and observations in the present context through this document- 'Collision of M S Chitra and M V Khalijia III'-- A Report

The incidence:
A collision occurred between Merchant Vessel MSC Chitra and MV-Khalijia at about 9.30 in the morning on 7th August 2010, resulting in damage to the bow of MV Khalijia and damage to the hull of MSC Chitra. MV Khalijia 3 was brought inside the port while MSC Chitra was aground about 1.5 miles from the prong’s reef. On sighting of Oil spillage the same day as far as Uran and Mandwa, Coast Guards initiated action immediately for prevention of the oil pollution whereas MbPt and JNPT took action to keep the navigation channels clear. DG (Shipping) ordered inquiry into the incident. Apart from oil spill, cargo of the ship also contains about 31 containers with hazardous cargo.

The Response:
The Hon’ble Chief Minister, Government of Maharashtra, conducted an aerial survey of the site to assess situation and to monitor the operations on 8th August 2010. He was accompanied by the Hon Minister and the Secretary for Environment and Coast Guard officials. The extent of damage was observed to 5 kms of the ship. He gave the instructions to the concerned district collectors to conduct water sampling on shore and to verify the extent of the oil spread. Hon’ble Chief Minister was told by the Coast Guard authorities that international salvage experts had arrived and are inspecting ship that day itself. The Hon’ble Chief Minister also directed the Coast Guard to monitor the situation regarding the salvage operations. Aerial Survey was also conducted by the Hon’ble Deputy Chief Minister and Minister of State for Environment. The State Government activated the State and District Disaster Management Authorities to mobilize volunteers for handling the situation.

Principal Secretary (Relief & Rehabilitation ), Government of Maharashtra, convened a meeting on 9th August 2010 for reviewing the environmental impact and containment of the oil spill due to collision of the vessels. The coordination work for arranging the meeting was supervised by the State Project Officer, Maharashtra DRR Project.

Oil Spill Issue
In this meeting, the issue related to oil spill was considered. A total 2662 tones of heavy oil and about 284 tonnes of diesel oil and 88 tonnes of lubricant oil was reported to be on board at the time of incident. About 600 tonnes of oil was apprehended to have leaked and the rate of leakage, according to Coast Guard, was 2-3 tonnes per hour. Coast Guard was coordinating the activity of dispersing the oil wherever possible and containing it with the use of oil booms wherever feasible. It was decided that the oil which may reach ashore was to be physically removed. For this purpose, necessary stock of gunny bags, saw dust and rice straw would be mobilized through district/local administration. For this purpose, State Pollution Control Board is coordinating the action with the support of district administration/local bodies. Coast Guard was requested to give them advance intimation about the oil slick approaching the shore.

Hazardous Cargo Issue
As regards hazardous chemicals, about 31 containers have hazardous chemicals of different description. These are out of 512 containers that were on the deck of the ship, which was heavily tilted at an angle of about 75 °.

Navigation Issue
Regarding safety of the navigational channel, about 200 containers which have fallen in the water are cause of concern. The containers which had sunk in the navigational channel were
identified through survey and with the help of navy divers and other marking of such locations were done by MbPT. JNPT earmarked areas where recovered containers could be stored. Action also needed to be taken using floating cranes and store them on barge in sheltered area. Similarly, containers which had sunk in the channel had to be removed on a priority basis so that any hindrance to navigation was removed.

Given the fact that the floating containers may obstruct the channel on a recurring basis, continuous survey of the channel was ensured.

**Fishing Issue**

As regards fishing activities, it was decided not to accord any new permission for fishing activity and fresh voyages to the sea for the purpose of fishing was discouraged. An advisory to that effect was issued on 9th August 2010. The situation will be reviewed after 15th August 2010.

The Department of Environment directed the concerned district collectors to get in touch with the FCI regarding availability of straw bags which can be used to prevent the oil slick near the sensitive areas of the coast, especially mangroves. Volunteers from NGOs and if possible, the National Disaster Response Force also needs to be requisitioned. BPT will be collating all the damage claims for centralized processing. DG (Shipping) ordered an inquiry into the event. Vessel MS Chitra has a valid insurance cover for Third party liability.

**Decisions taken in the Meeting chaired by the Honourable Chief Minister of Maharashtra on 10th August, 2010**

Honourable Chief Minister of Maharashtra reviewed the situation arising out of the collision between vessels M.V. “MSC Chitra” and M.V. “Khalijia – 3” off Mumbai coast.

Initiating the discussions, the Chief Minister observed that the background of the events is known to all participants. The discussion should as such focus on the issues at hand, the solutions proposed and the likely time frame thereof. To begin with, the issue of oil spill was taken up. The Coast Guard representative indicated that 500 – 600 tonnes of oil is likely to have flown into the sea out of the 2 ruptured fuel tanks on the port side of the vessel, “MSC Chitra”. No seepage is noticed since yesterday (09.08.2010) afternoon. If the ship remains stable, further seepage of oil may not occur. He also informed that the salvagers, M/s. SMIT International, Singapore propose to carry out fuel evacuation from the remaining tanks (approximately 2000 tonnes) from 13th August to about 19th August, 2010.

Regarding the issue of navigational channels being cleared for movement of ships, the Chairman, Mumbai Port Trust (MbPT) informed that the channels are closed since Sunday (08.08.2010) for both the Ports, Mumbai Port and Jawaharlal Nehru Port (JNPT) and the situation is likely to remain so till Saturday (13.08.2010) due to floating/sunken containers in the channel. Since more containers are falling out of the ship, the chances of their entering the navigational channel cannot be ruled out.

At this stage, the Director General of Shipping (DGS) informed that a coordination meeting does take place at the Directorate General of Shipping, Mumbai (DG Shipping) every day at 1030 hours and if necessary, at 1600 hours involving all concerned agencies. He indicated that the salvagers planned to work on 2 fronts simultaneously, oil removal and ship stabilization on one hand and removal of containers from the navigation channels on the other. The slow pace of pumping out the oil is on account of keeping the ship stable simultaneously hoping to reduce her tilting. Even marginal reduction in the tilt would be useful for a more effective salvage operation.

The salvagers are also bringing their accommodation barge near the present ship to handle the newly falling containers. They are also mobilizing divers and support vessels to remove sunken
containers from the channel. Given the present support available, they hope to remove about 4 - 5 containers every day once their location is known. The process can be speeded up with 2 more support vessels to expedite removal of all containers. Mobilisation of support vessels is being facilitated by the Port authorities and the DG Shipping. He cautioned that the Ports may have to initially resort to restrict movement of ships, given that newly falling containers may move into the channel.

The Chief Minister appreciated the idea of daily coordination meeting to sort out operational issues. He desired to know the responsibilities regarding identification of the containers and their removal. The representative of Indian Navy indicated that they will be surveying the channel regularly based on the priorities indicated by the Port. These containers will then be marked with the assistance from Port authorities and Directorate General of Lighthouse and Lightships and salvers will make efforts to remove them away from the navigational channel. While Chief Minister appreciated the efforts to open the channel to traffic by Saturday (14.08.2010), he desired that the contingency of further delay in opening of channel should be addressed. This was important in view of the supply of Petroleum and Oil Products (POL) for Mumbai in particular and the state in general. The Chairman, MbPT pointed out the possibility of more supply being effected through pipelines rather than ships even if it affects the quality of products like LSHS. The representative of Oil Company indicated that this would still require movement of some of the relatively smaller ships to ensure supply of certain products. The representative of Oil and Natural Gas Corporation Limited (ONGC) also requested for permitting movement of their small Offshore Support Vessels. The Additional Chief Secretary (Home) emphasized the need for getting the channels cleared and resuming the supply of POL given the forthcoming festival season. The Chief Minister desired that the daily coordination meeting held by the DG Shipping should look at the operational aspects and ensure that partial navigation is restored at least by Friday (13.08.2010).

As regards the oil that spills ashore, doubts were expressed about the efficacy of manual efforts to handle the problem. The Coast Guard (CG) representative indicated that this is done worldwide. Beyond a point machinery like skimmers is not helpful. The Secretary (Environment), Government of Maharashtra wanted the shipowners to take up the clean up operations.

The Nautical Adviser to the Government of India (NA) explained at this stage the scope and the availability of admissibility of compensation claims. It was indicted that the ship has a valid insurance cover for third party liability. As such, the claims affecting the livelihood and loss of income as well as the expenditure incurred in mitigation of the environmental damage and restoration is admissible. He however, emphasized that the documentation has to be done properly. A copy of the ‘Claims Manual’ had already been circulated in the daily coordination meeting held in the morning on 10th August, 2010. This could be made available to the concerned departments.

It was decided that the Maharashtra State Pollution Control Board (MSPCB) will be lead agency in regard to oil pollution ashore and assistance will be provided to them by various agencies involved.

The issue of fishing activities was also discussed at this stage. While the fishing activity in the 12 nautical mile range was banned till 15th August, 2010, some of the fishing vessels have permission to fish outside 12 nautical miles limit. Restriction of their movement now and restriction on fishing in the 12 nautical mile range, after 15th August, 2010 would be required to be carefully documented for compensation claims. On the question of determining the hazard in consumption of fish, it was decided that suitable sampling methodology will be evolved by the Fisheries Department and the Brihan Mumbai Municipal Corporation (BMC). The Commissioner, BMC informed that about 500 Kgs. of fish samples at Sasson Dock, Sewree and Bhaucha Dhakka
were prima facie found contaminated. As such, there was a need for stepping up sample testing.

The question of pollution by containers carrying hazardous goods also came up for discussion. The DGS informed that 31 containers out of 512 containers on the deck carried hazardous chemicals. Out of these, 25 containers carried solid sodium hydroxide, which were not a cause of much concern. Other 6 containers mainly carrying pesticides could pose some threat if these leak into the water. The MSPCB has to keep monitoring the water sample to watch for any signs of pesticides contamination. The BMC Commissioner suggested that the numbers identifying these containers should be made widely known to put public on alert. The Chief Minister suggested that this can be done through a Press Note. DGS indicated that these numbers have already been shared with MSPCB and other stakeholders.

Secretary (Environment) informed that oil slick has been noticed at Gateway of India, Cuffe Parade and Vashi. The Member Secretary, MSPCB requested for vessels support for taking samples of water in deep sea. Both JNPT and ONGC offered to help in this matter.

Finally, the Chief Minister desired to know as to the action that was being taken against the Captains of the ship. It was informed that cases have been registered against both the Captains. Arrest has, however, been deferred on account of the involvement of the Captain in assisting the technical teams involved in salvage operations. The DGS informed that the Captain of the vessel, MV “MSC Chitra” is an Indian national. In fact, 35 out of 37 crew members of the said vessel are Indian nationals. The Chairman, MbPT suggested that the Captain of the vessel should not be put under arrest at this stage given that he was required to assist in the salvage operations. The Chief Minister desired, however, that investigation should follow its own course. He also ascertained whether the inquiry being done by the DG Shipping, has already been initiated. The Chief Minister also desired to know the timeframe of removal of the ship from its present location. The Nautical Adviser informed that this could take minimum 45 - 50 days if the vessel can be re-floated, otherwise, wreck removal procedure will have to be followed, which may take 4 - 6 months. Since the ship has a valid insurance cover and a reputed salvage party is involved, delays of the kind reported in newspaper about a sunken ship in Goa are not likely to happen.

The question regarding availability of land for CG was also discussed. The Chief Minister expressed concern about such facility not being made available by the JNPT. The Chairman, JNPT expressed his inability to provide land since the availability of water front in JNPT was severely limited. Moreover, the Port development plan had already been frozen under the National Maritime Development Programme (NMDP). Chief Minister observed that this matter would be taken up at higher level with the Central Government given the security requirements of the State.

The Chief Minister expressed hope that some positive results should be available by Friday. He also desired that the daily coordination meeting should be continued by the DG Shipping involving all stakeholders to review and resolve the operational issues.

**Responsibilities and time frame assigned to the various agencies are as follows:**

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<tr>
<th>SI No</th>
<th>Issue</th>
<th>Agency</th>
<th>Action</th>
<th>Date</th>
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<tr>
<td>1</td>
<td>Oil Spill</td>
<td></td>
<td>Monitor, Spray, Contain, Inform Admn</td>
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<tr>
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<td>In Sea</td>
<td>Coast Guard</td>
<td></td>
<td>Continuing</td>
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<tr>
<td>1.2</td>
<td>Seepage</td>
<td>Coast Guard</td>
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<td>Salvers</td>
<td>Plug, Pump out</td>
<td>12-19 Aug</td>
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<tr>
<td>1.3</td>
<td>Oil Ashore</td>
<td>MPCB</td>
<td>Co-ordinate, Map locations, work out technical options</td>
<td>On going</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dist/Local Admin</td>
<td>Physical removal, Mobilise persons and material</td>
<td>On going</td>
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**General Observations**

The situation was reviewed by the Government of India. High-level meetings with the concerned officers were held in Mumbai on the 13th and 14th August 2010. The National Environmental Research Institute and the National Institute of Oceanography are enquiring into the adverse impact on mangroves, marine lives, fishing community and marine eco system as a whole. Preliminary assessments suggest that 25 KM stretch of 100 KM belt had been completely destroyed. The regeneration will take at least two years. Expert opinions vary with regard to the use of bioremediation.
Cleaning of the shores is in full swing. NGOs and volunteers have joined hands with the Government machinery in cleaning up the oil slick on the reefs and removing of garbage piled up on the reefs. For cleaning up the slick on the rocks, low pressure water pumps are being used. Expert advise are being provided by the Indian Oil Corporation.

The issues that has emerged and lessons learnt upto this point of time can be summarized as follows:

- The magnitude of the disaster could have been minimized if the agencies has proper equipment and expertise in handling pollutants.
- The National Oil Spill Contingency Plan of 2006 stipulates that the agencies like port trusts to have tier –I basic facilities to fight an oil spill. Basic emergency response equipment like booms, moppers and skimmers -- used in port cities across the world, was unavailable either with MbPT or JNPT.
- The coast guards were fighting a lone battle to contain the oil spill. No other agency was having the requisite resources to augment the efforts. India had not faced oil spill of this magnitude earlier.
- The Nodal Agency for disaster Management in the Country i.e. National Disaster Management Authority is not looking after the oil spill disaster. No guidelines is available in the country for the coastal states to handle such type of disasters. A protocol needs to be urgently developed for fighting oil slick.
- Maharashtra Government was looking for a Standard Operating Procedure for tackling such disaster. But unfortunately no SOP was available. Even for publishing Model Dos and Don'ts of Oil Spill disaster, government of Maharashtra had to rely on common sense.
- In the absence of proven modern methods of neutralizing the effects of oil slick, Maharashtra is depending on the traditional, slow, outdated techniques mainly due to assured result. Tax payers money at this juncture tax payers money cannot be used for experimentation. So sufficient R&D is required to face such disasters in future.
- As per the existing arrangemnts, the coast guards are expected to step in only when the oil spill is more than 700 MTs. Considering the abysmally low level preparedness of other central government and state government agencies, such a limit needs to be done away with.

Hope this helps.

Ajit Seshadri, The Vigyan Vijay Foundation, New Delhi (Response 2)

An article titled- "Shoots of recovery in oil- soaked mangroves" in TOI pg 12 main paper Delhi Edition by Simit Bhagat, brings a news of relief and also stating that "new leaves have sprouted on the oil soaked in mangroves"

This is probably possible, because oil and its layery film is getting self- remedied, both by application of microbes and oil- zapper ( external application material from TERI ) and by nature's fresh- rain water, sunny days with UV, some lower- level material having anaerobic action above gound and the cleanup process in progress. In this process the leaf foliage from decayed mangrove greens etc. , and other associated bio- mass, is getting turned into modified earth matter and supporting plant- life, eco- system.

This bio- mass would be rich in nutrients and oil's hydro- carbon getting transformed into earth matter and spread on coasts terrestrial surfaces, sandy shores- whch would be porous, sandy patches with rocks and mangroves in abundance, some aiding the natural process of bio-remediation and some neutral and adverse also.

It was also reported that the Project Team had members from TERI- led by Dr. Banwari Lal, and also Dr. Mahendra Pratap Singh from Indian Oil R&D Cntr, working at site.
We extend our well wishes to the Project Team working at the site etc..

Many thanks to all who contributed to this query!

If you have further information to share on this topic, please send it to Solution Exchange for the Disaster Management Community in India at se-drm@solutionexchange-un.net.in with the subject heading “Re: [se-drm] Query: Seeking expertise for handling Oil Spillage in Mumbai-Referrals, Advice. Additional Reply.”

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