- Oil spills can have a serious impact on coastal activities and those who

use or benefit from the resources of the sea. In most cases, such damage is temporary

and caused primarily by the physical properties of oil creating nuisance and

- hazardous conditions. However, in some situations many years may be

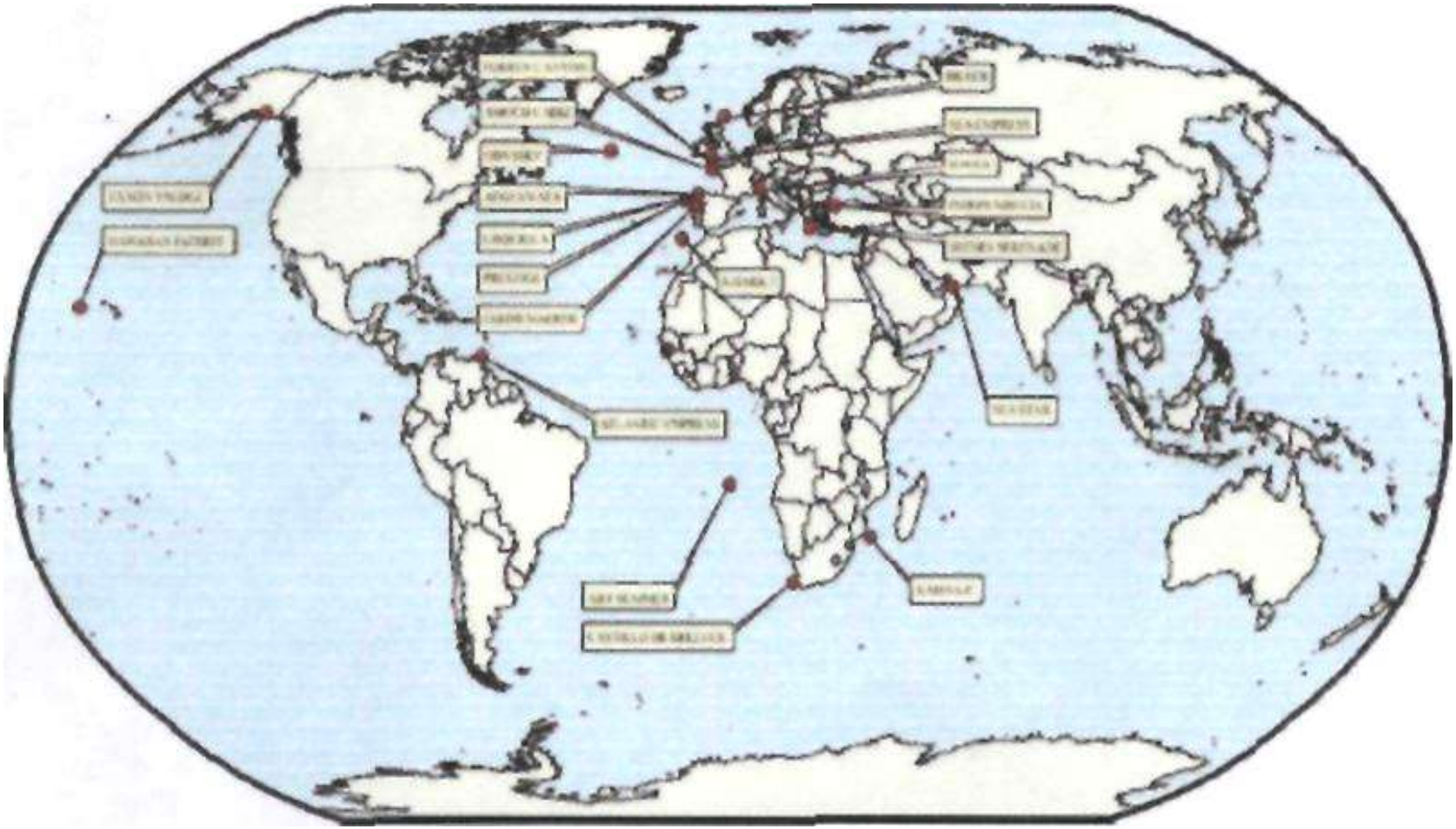
required for recovery to tack place and on rare occasions, the damage may be irreparable.

The impact on marine life is compound by toxicity and tainting effects resulting

from the chemical composition of oil, as well as by the diversity and variability of biological

systems and their sensitivity to oil pollution. However, damage to the environment

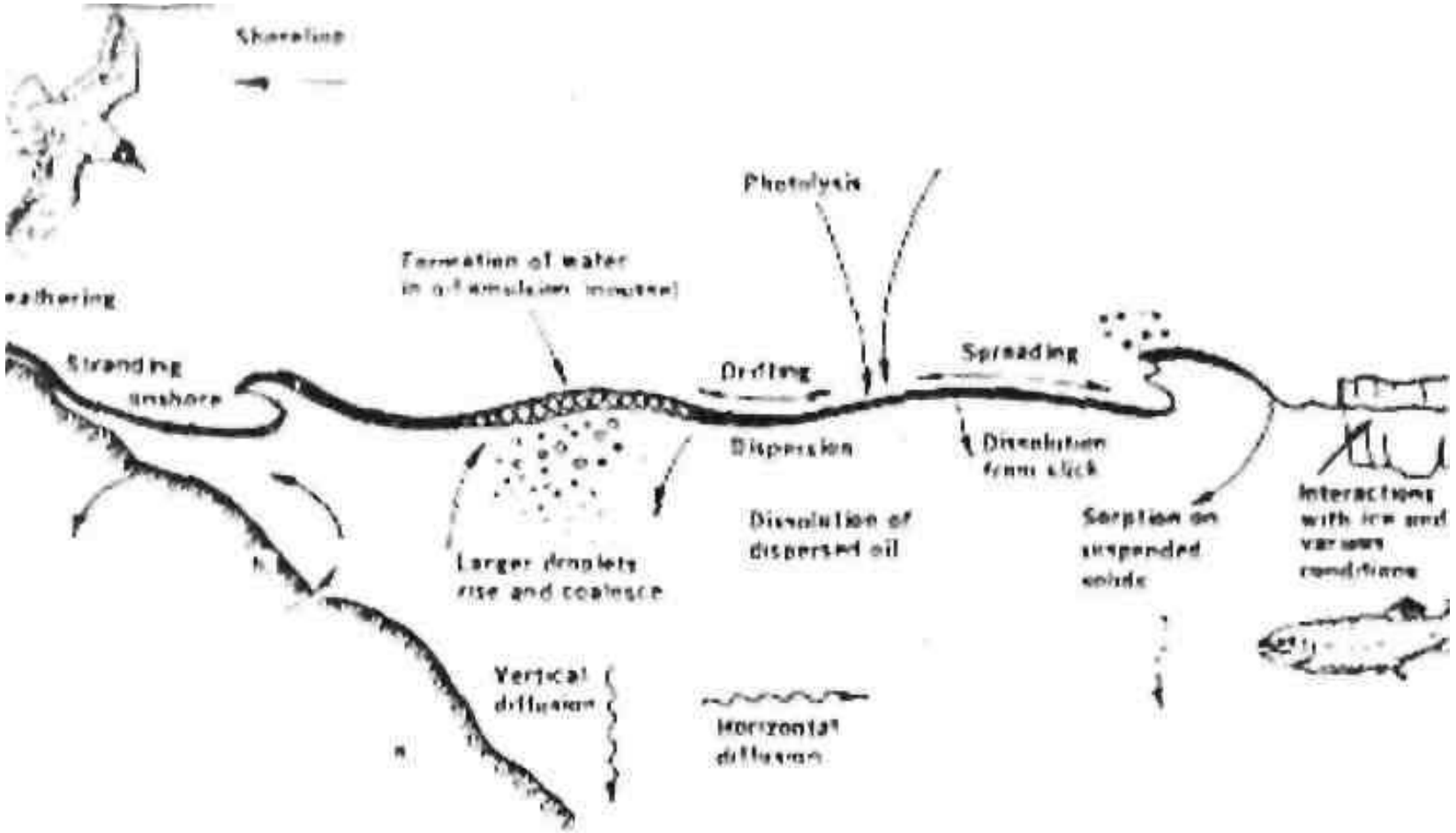
can often be minimized if correct countermeasures are taken promptly.



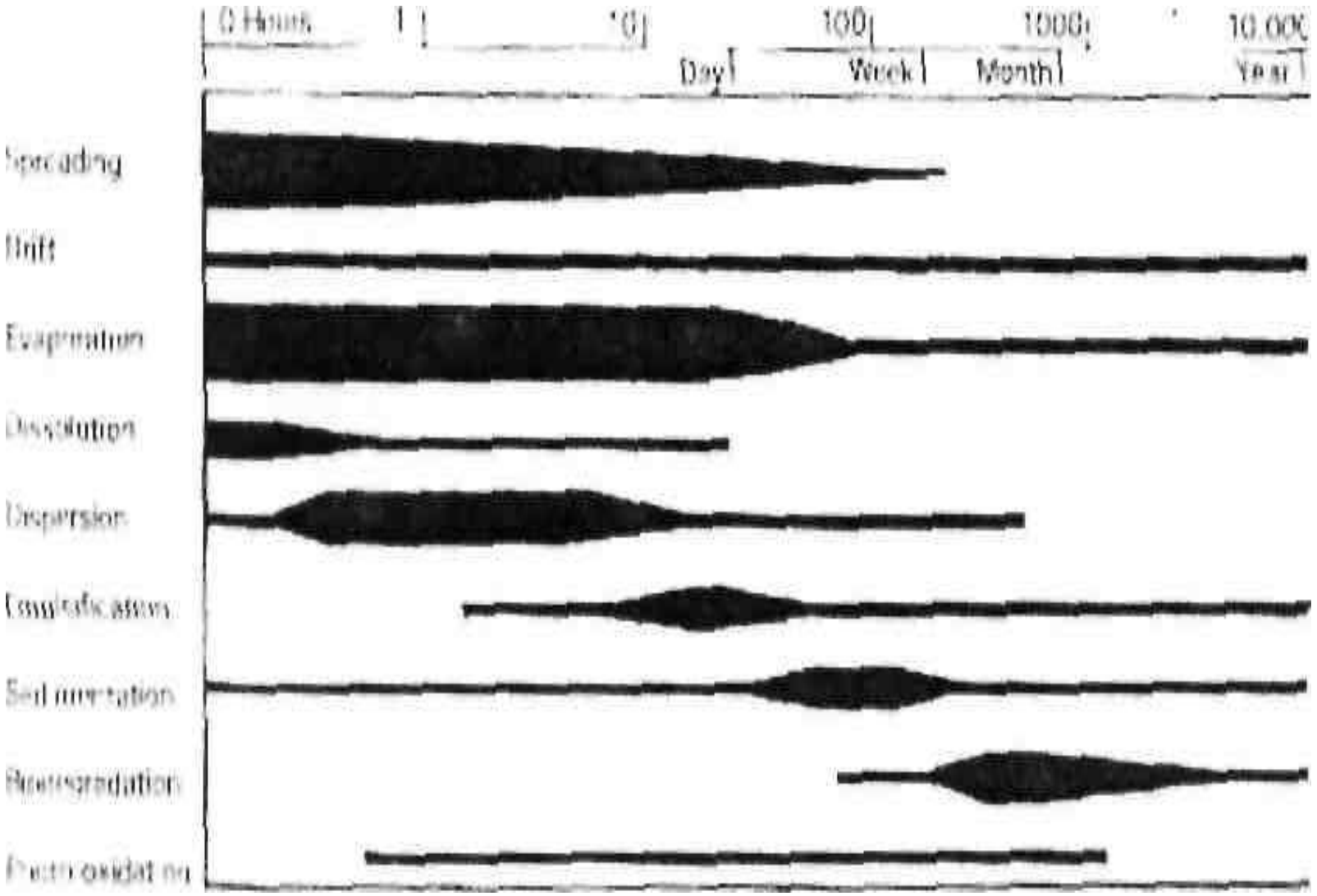
Types of OIL

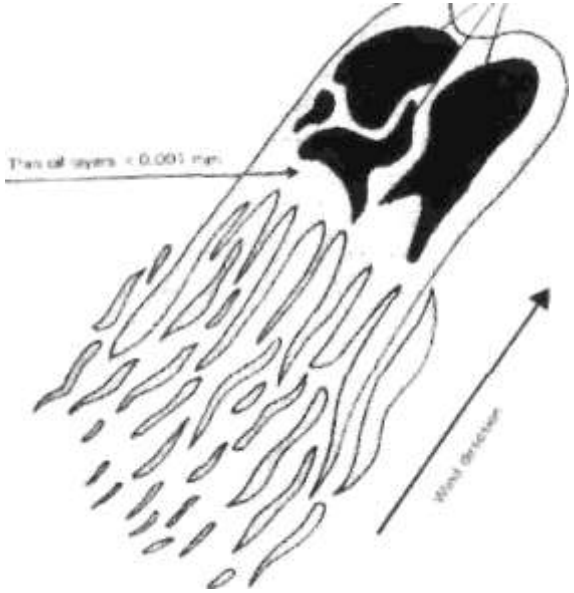
- Crude oils are complex mixtures of hydrocarbons of varying molecular weight and structure comprising the three main chemical groups, paraffinic, naphthenic and aromatic. These hydrocarbons range from simple, highly volatile substances to complex waxes and asphaltic compounds which cannot be distilled. Oxygen, nitrogen, sulphur, vanadium, nickel and mineral salts, crude oil will fall within the following range

Specific gravity, 15/15° C	800 to 980 kg / m^3
Initial boiling point °C	30 to 125
Kinematic viscosity ntistokes cSt, at 40°C	3 to 100 (15-20,000) but can be as much as 20,000 even at 40oC
Pour point °C	-3 to + 25 but can be lower or as high as 43
Flashpoint (Abel) °C	**-18** to 190
Sulphur % wt.	0.08 to 5
Wax % wt.	up **to 15**
Asphallencs % wt.	up to 5
Vanadium, ppm V	5 to 170


Photolysis
Spreading
Drifting
Stranding
onshore
Dispersion
Dissolution of
dispersed oil
Larger droplets
rise and coalesce
Vertical
diffusion
Horizontal

Processes taking place after an Oil spill




Thin oil layers < 0.001 mm
Wind direction

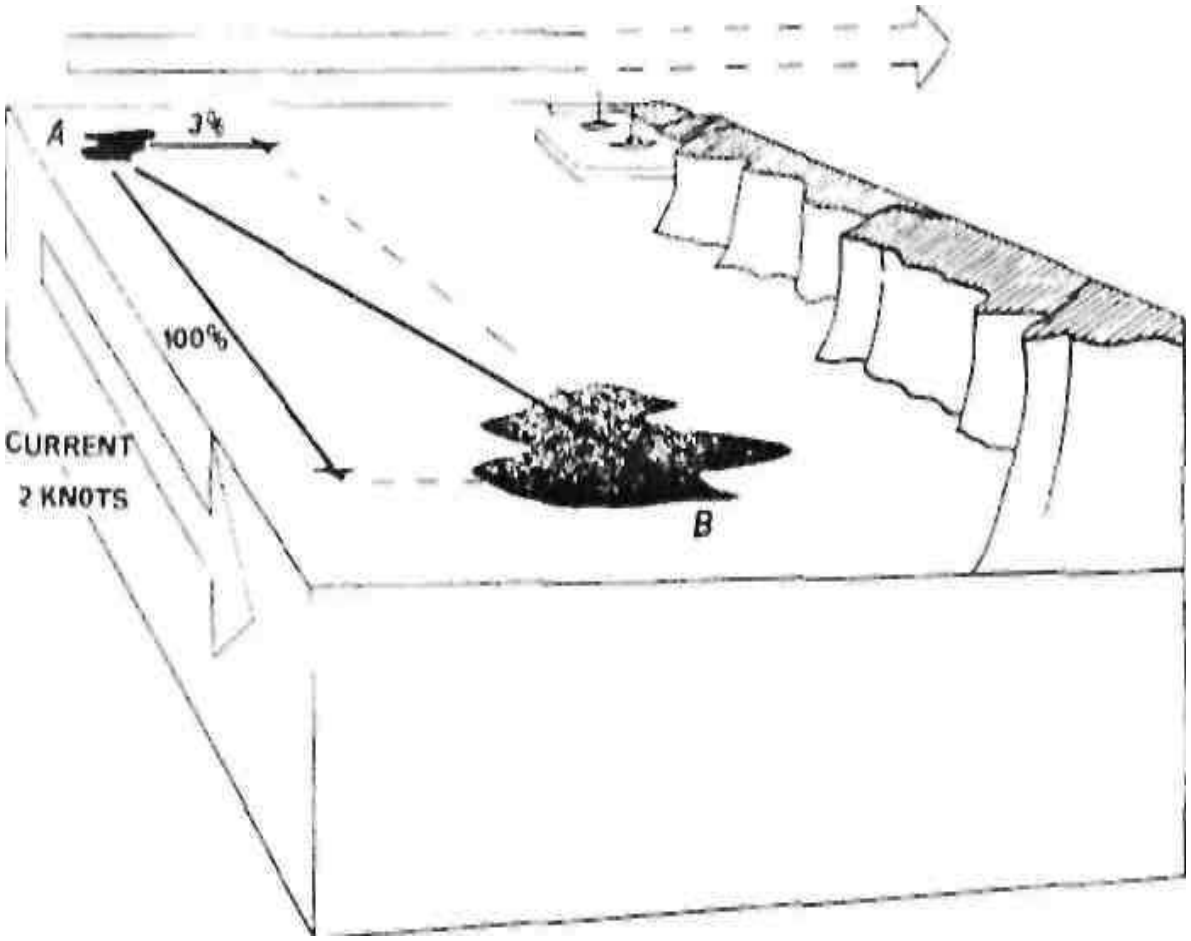
Evaporation

- The most important process removing the oil from the water surface is evaporation. The speed and extent of evaporation depends mainly on the proportion of low-boiling fractions in the oil. Thus, light oils like gasoline or light fuel oil evaporate very quickly (50% within few hours). Heavy oils evaporate more slowly and less extensively. Besides the oil type, evaporation rates depends on the amount of spilled oil , the weather conditions and ambient temperatures. As a general rule the higher the wind speed and the ambient temperature, the greater the rate of evaporatio

Movements of oil slicks

- An oil slicks will not usually stay in the same position but will drift under the influence of external factor. The most important of these factors are winds, waves, tides and currents. The transport of water, particularly surfaces waters in the sea, due to wind, waves and currents is a difficult topic about which much remains known. Friction between wind and water induces a current at he sea surface which is negligible a few millimeters below the surface. The presence of oil on the water surface alters this vertical current profile. Oil on open water will move more
- quickly than the water directly beneath it, with the result that oil towards the Ice side of a slick will be thicker than that to windward. In addition, the slick will rapidly become elongated and will form windrows. The speed with which an oil slick drifts under the influence of the wind depends on wind strength and oil thickness. Typically it will move at between 2% and 5% of the speed of the wind measured 10 m above the water surface. In open water, 3% of the wind speed is normally used to estimate drift rate.

The influence Of 3% of the wind speed with 100% of the current result in the movement of oil from A to B



- Many computer models of varying sophistication have been developed for predicting this fate. These models can provide a reliable output if the input information is correct. The result will stand or fall with the input data and this very information is often not available. However, simple formulae using limited information can give adequate predication and tools such as an oil spill slide rule can be useful for on-scene commanders during clean-up operations.

Effects of oil on marine and coastal resources

Ecological effects

- Depending upon the presence of factors noted in the introduction to this chapter, ecological effects in habitats, changes in growth, physiology and behavior of individual organisms and species, toxicity and increased mortality in individual organisms and species and destruction or modification of entire communities of organisms through the combined effects of toxicity and smothering.

Ecotoxicology

Bioaccumulation and tainting

Fisheries

Long-term effects

Coral communities and ecosystems

Recovery rates

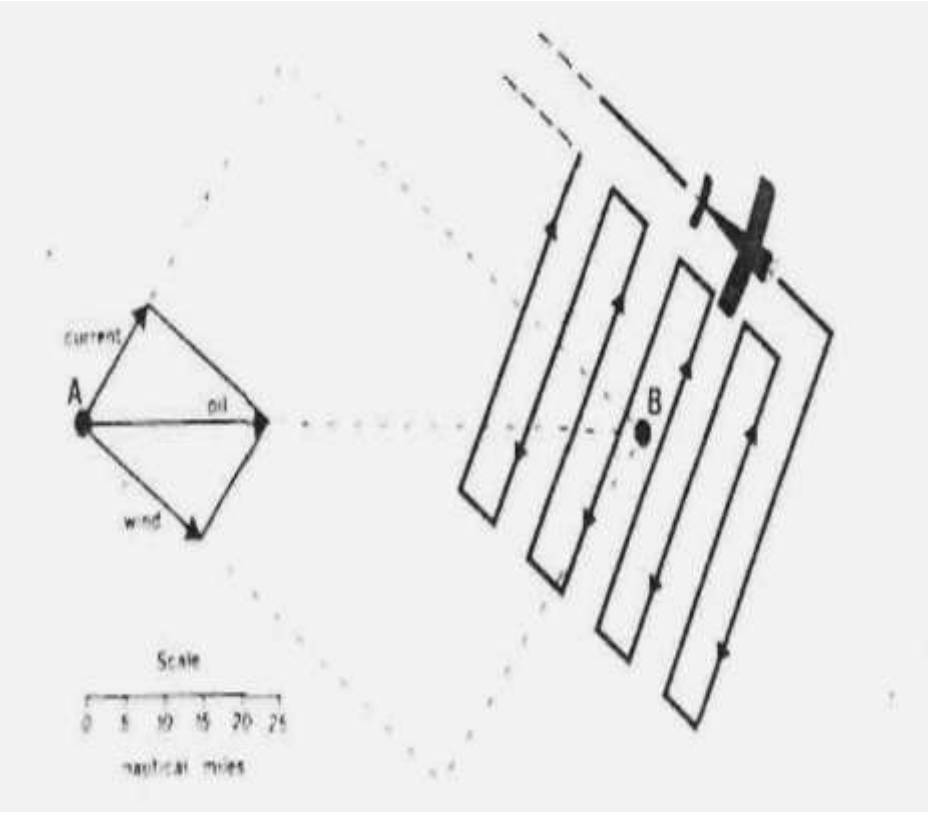
Factors affecting impacts of oil

- Salt-marsh and mangrove ecosystems possess several physical features in common which contribute to their sensitivity to oil spills; a network of channels that help to transport oil deep into the vegetated coastal margin; low wove energy (so that natural dissipation is minimal) and a preponderance of fine, highly organic, anaerobic sediments that entrap the oil and hold it for long periods. Mangroves are particularly sensitive because uptake of oxygen through the pores on aerial root systems may be impeded by a coating of oil.

Aerial surveillance, including remote sensing

The purpose of aerial surveillance

- to determine the size, quantity and location of the spill;
- to determine the movement of the oil;
- to note changes in the appearance and distribution of the oil over time;
- to forecast which marine and coastal resources or areas are under threat; and .
- to observe and report on effectiveness of response measures.



Movement of oil /from A to position B three days later, predicted by combining 100% of the current speed and 3% of the)in.
speed as shown. The arrows from A represent current, win.
and oil movement for one day. A cross-wind ladder search pattern is shown over position B.