Small Craft Advisory

Presented by

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Outline

➢ Introduction

➢ Highlights from literature

➢ Experimental setup at INCOIS

➢ Warning criteria

➢ Flow Chart : SCA

Introduction

- Indian coastline   : 8000km approx.

- Contribution of fishing to national GDP   : 1.07%

- Fisherfolk population   : 4 million

- Percentage of fisherfolk below BPL   : 61%

- Fishing vessels   : 194,490

Wave forecasting at INCOIS
- Wave models used : SWAN, MIKE and WW3
- All are phase averaged
- Output parameters : Hs, Tp, Tm02 etc.
- Capsizing of boat is not a phase average phenomenon

Source : International Collective in Support of Fishworkers (ICSF)

Introduction

Causes of capsizing

• Human (80%)
(misjudgement and attention problems,
Alcohol consumption, insecure opening,
Overloading etc.)

• Sea State
(freak or rogue waves, breaking wave,
rapid development of sea, directionality
 of waves etc.)

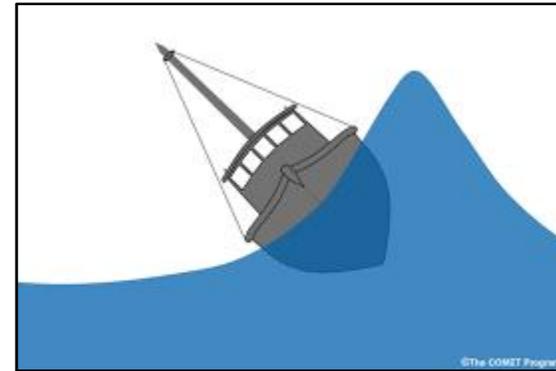• Ship Stability
(time period of boat, ship design etc.)

Capsizing of ship
Source : google images
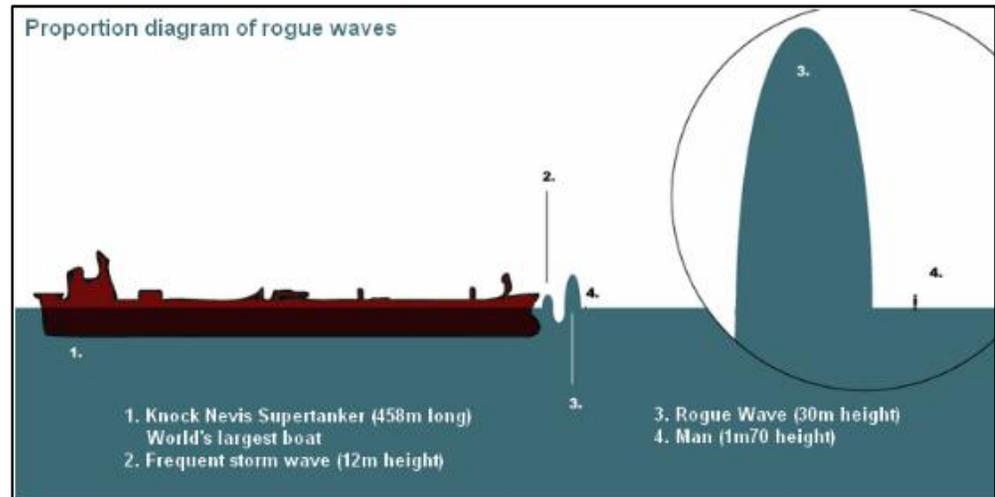
Introduction

- ## Steepness
Taken as H/L

Wave steepness
Source : google images

- ## Freak or Rogue waves
Abnormally high waves

Proportion diagram of rogue waves

1. Knock Nevis Supertanker (458m long)
   World's largest boat
2. Frequent storm wave (12m height)
3. Rogue Wave (30m height)
4. Man (1m70 height)

Rogue waves
Source : google images

Definition : SCA

To ensure safety of small fishing vessel, Small Craft Advisory (SCA) was proposed

Small Craft Advisory

- Advisory issued to small fishing boats so as to prevent them from capsizing
- Prior intimation will reduce economic loss, loss of human life.

Highlights From Literature

Factors contributing to capsizing of boat

- Breaking waves have very high contribution in capsizing; and steepness can be considered as a parameter for the same
- Resonance between time periods of boat and waves.
- Wave steepness in combination with wind velocity contribute to capsizing
- Rapid development of sea causes many accidents
- High wave with high directionality of wave field is one of the reasons for capsizing
- Non uniform currents and wave current interaction are contributing factors

Experimental setup at INCOIS

- SWAN wave model output is available at Pondicherry 250m × 250m resolution (3 hourly 3days)
- Parameters : steepness, mean period, peak period and wave height ..
- Soon it will be improved with ADCIRC+unSWAN with 100m resolution as its finest
- WRF winds at 3km resolution (1hourly 3 days)
- Parameters : wind speed and direction
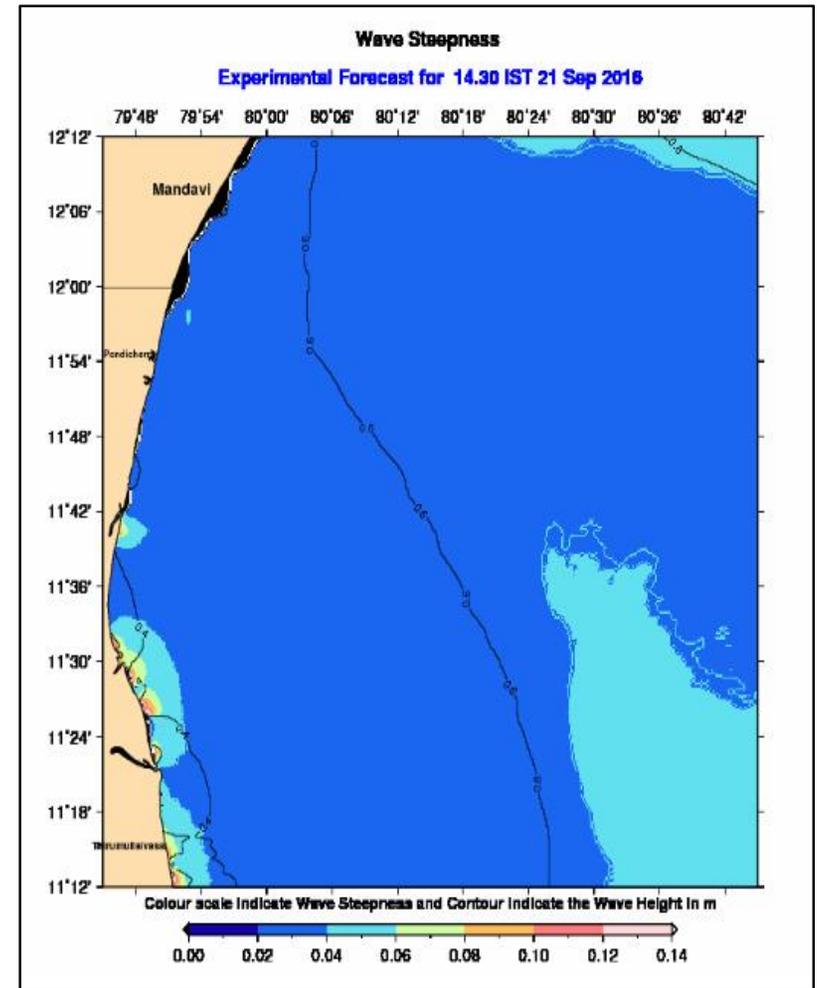
Wave steepness output (SWAN)
Source : INCOIS website

Warning Criteria

- ## Steepness Index

$$I_{steepness} = \frac{steepness}{0.05} \times \frac{H_{m0}}{H_0} \qquad \textit{H}_0\textit{=2.5m (For Indian location)}$$

Threshold value : 1

- ## Cross Sea Index

$$I_{cross\_sea} = \frac{1}{2} \times H_{m0} \times \exp(-10 \times (\dagger_s - 1)^2)$$
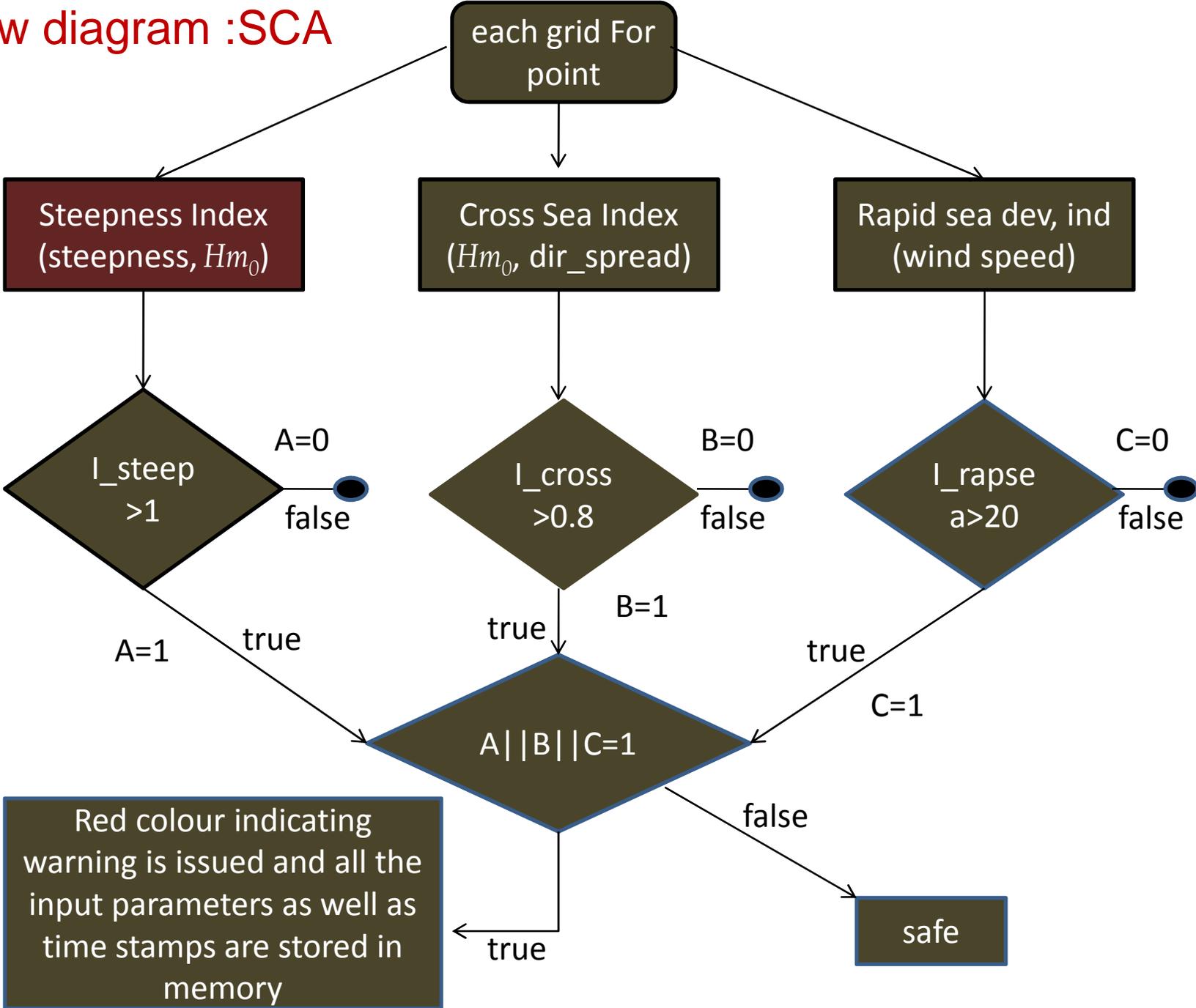
Threshold value : 0.8

Warning Criteria

- **Rapid Sea Development Index**

$$I_{rapid\_dev} = \frac{w_t - w_{t-6}}{w_{t-6}} \times 100$$

Threshold value : 20

Flow diagram :SCA

Thank You