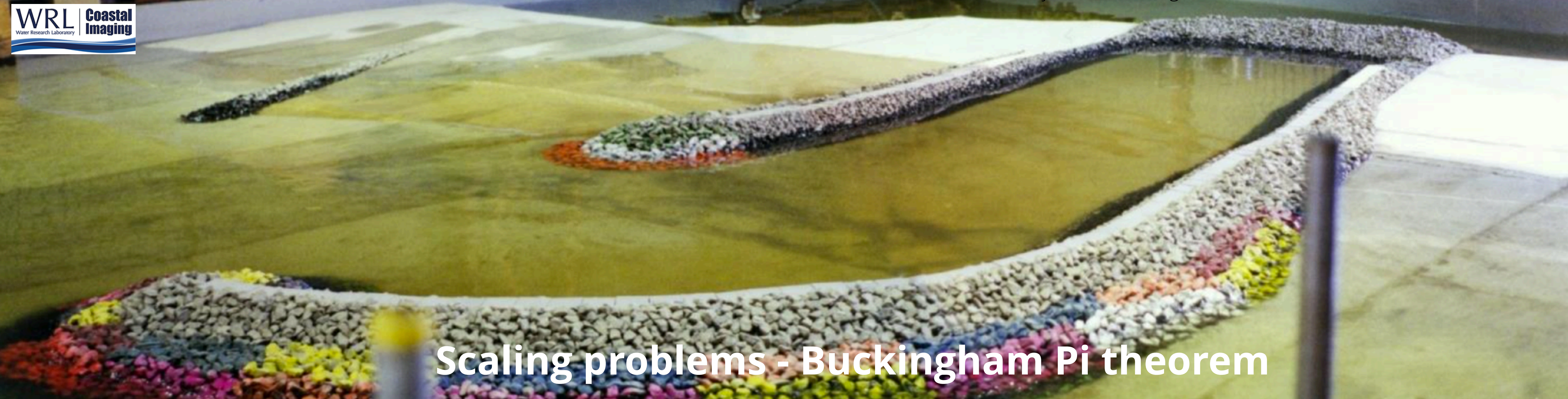


# Physical modelling: laboratory models

Physical Modelling of Shell Cove Boat Harbour Entrance (NSW)



## Scaling problems - Buckingham Pi theorem

- Substitution of the fundamental units for each variables gives

$$\pi_{1..3} = [LT^{-1}]^{k1} L^{k2} [MLT^{-2}]^{k3} [ML^{-3}]^{k4} [ML^{-1}T^{-1}]^{k5} [LT^{-2}]^{k6}$$

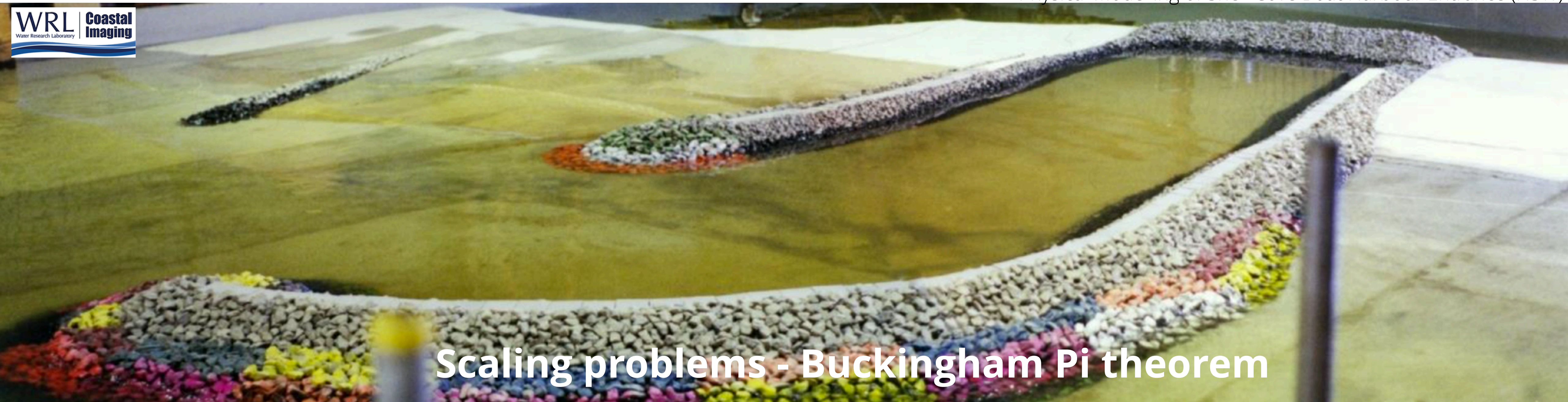
$$\pi_{1..3} = [L]^{k1+k2+k3-3k4-k5+k6} [T]^{-k1-2k3-k5-2k6} [M]^{k3+k4+k5}$$

- Notice the coefficients of the k values correspond to the values in the dimensional matrix.



# Physical modelling: laboratory models

Physical Modelling of Shell Cove Boat Harbour Entrance (NSW)



## Scaling problems - Buckingham Pi theorem

- For the  $\pi$  to be dimensionless we need to have:

$$k_1 + k_2 + k_3 - 3k_4 - k_5 + k_6 = 0$$

$$-k_1 - 2k_3 - k_5 - 2k_6 = 0$$

$$k_3 + k_4 + k_5 = 0$$

- each dimensionless which be a combination of  $\mathbf{k}$  satisfying the set of equation below.