

# Influence of distribution co-efficient on radionuclide transport modelling of uranium from a tailings pond in northern Karnataka, India

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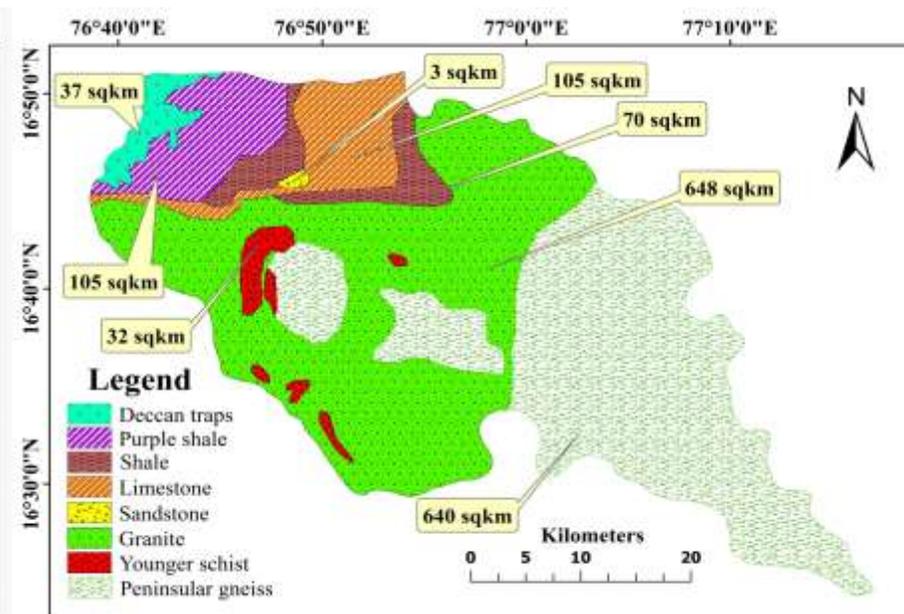
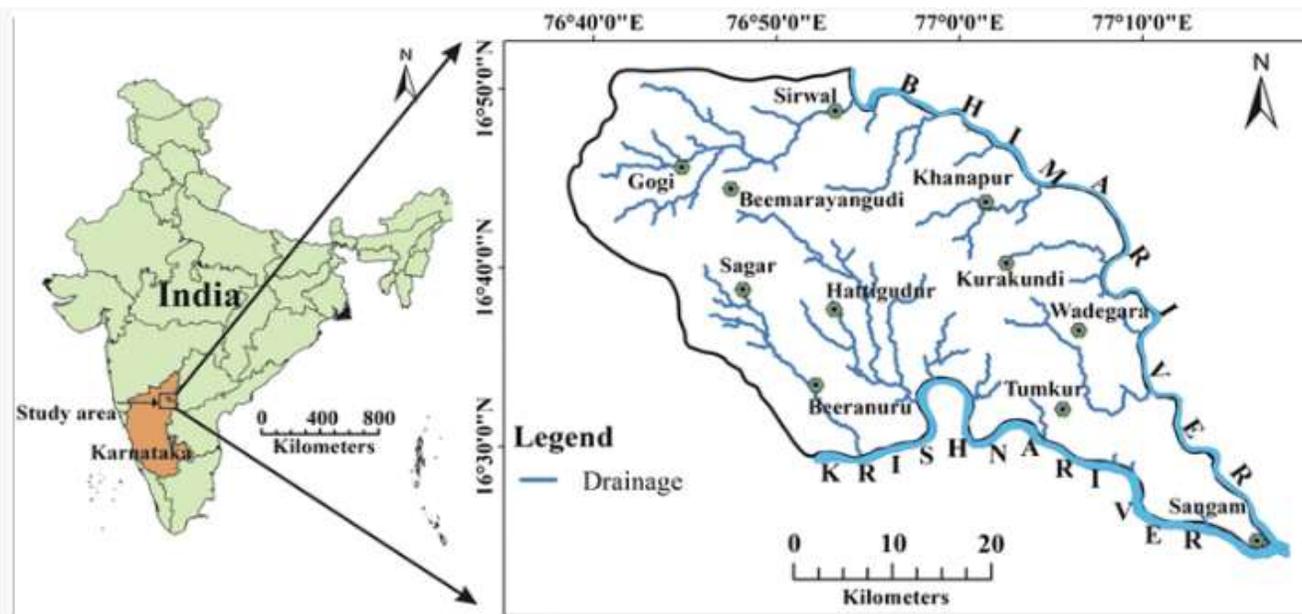
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# • Introduction

- Distribution co-efficient ( $K_d$ ) - crucial input to evaluate long-term impact of uranium migration (Elango et al., 2012; Manoj et al., 2019)
- Most contaminant transport modelling studies use  $K_d$  values reported in literature (Elango et al., 2012; Sohlenius et al., 2013)

# • Study area & Geology



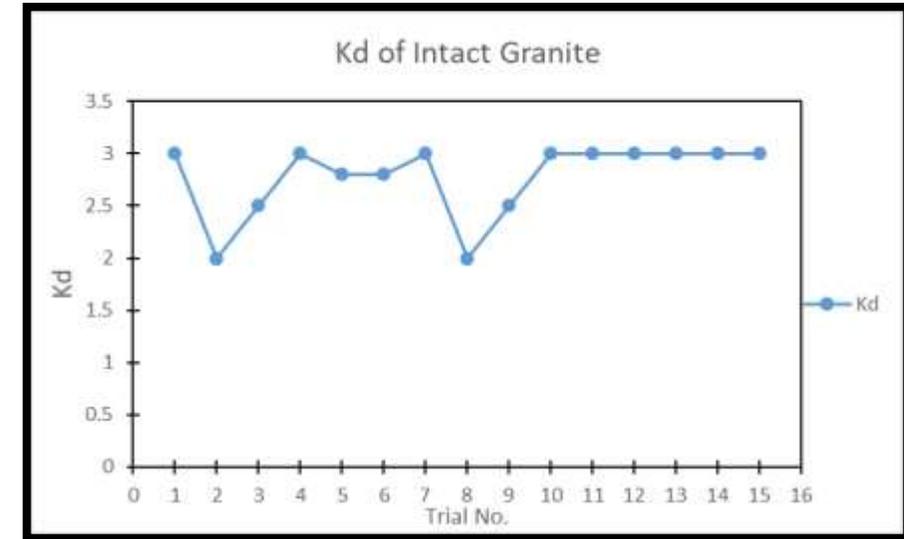
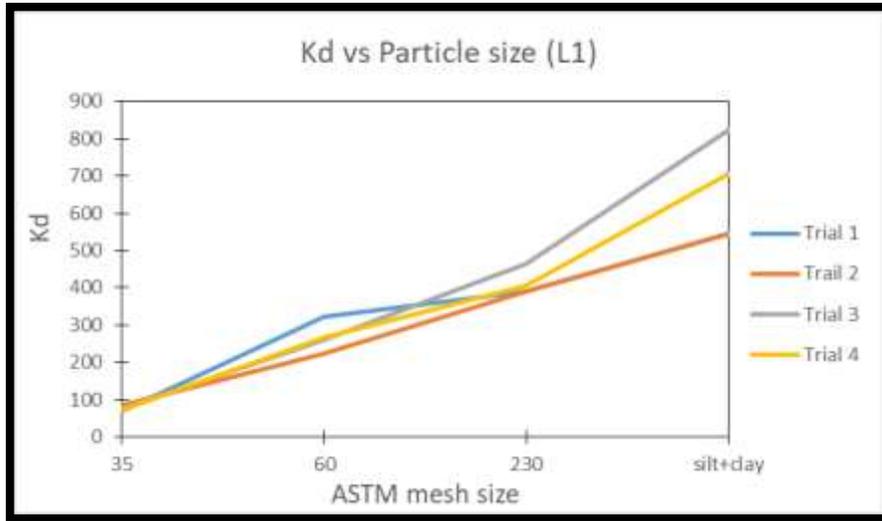
- Shahapur taluk, Yadgir district, Karnataka
- Uranium ore – 0.2 % Medium grade
- Study area consist of 5234 sq.km
- Tailings pond – 10 km apart

- **Objective-** To study the impact of field Kd values (rock) in migration of radionuclides from a proposed tailings pond area to improve reliability of model output/ Reduce uncertainty
- **Methodology-** Batch test



- Necessity to investigate actual geological environment since sorption occurs on intact rock in actual field conditions
- To understand impact of Kd on retardation factor – model results better reliability
- Sorption studies on intact rocks as well as crushed rocks
- Conventional batch technique carried out with a S/L ratio of 1:10
- Samples placed in rotatory shaker for 72 hours (equilibrium time) in U concentrated solution
- For powdered samples, the supernatant is filtered and centrifuged in 2000rpm and checked for U concentration
- Intact sample supernatant is filtered and checked for U concentration

- **Discussion- Powdered rock Kd (L1- Granite)**



- Low Kd values of intact samples due to lower surface area
- Many closed pores in intact samples cannot be accessed
- Changes in pore properties – changes pore connectivity – reducing increasing sorption abilities
- The rock samples -main minerals are quartz, feldspar
- Retardation factor,  $R_t = 1 + \frac{K_d \rho_b}{\theta}$
- The porosity and Kd values can be further applied to this formula and hence the response of the reactive transport model can be determined