

# Thoughts on sediment control and comprehensive utilization of water resources in the Yellow River beach area

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## Objectives

The Yellow River has become the most complex and difficult river in the world because of "less water and more sand, different sources of water and sand, and the uncoordinated relationship between water and sand". The lower reaches of the Yellow River is a "wandering type" river, because of the long siltation, it has become a world-famous "hanging river". The traditional sediment control scheme of "blocking, discharging, releasing, adjusting and digging" is limited in the management of the beach area due to various reasons. Innovative introduction of "sand guide" device, with lower investment, to achieve better beach management results.

## Methods

There are two main kinds of "sand guide" devices. One is that can be suspended on the river sediment surface and can roll under the action of natural water thrust, using the shovel structure on the surface of the sphere to realize the spherical dredging device of stirring sand and disturbing sand. One is a conical dredging device that can sink fixed and floating displaced. The "wavy" bulge of the cone surface is used to change the direction of water flow and make the water flow pulsate, realizing the effect of water diversion and sand transport. In addition, it can also be designed to drag the sediment under the action of natural hydraulic force, and the underwater sand transport device that can be screened out along the process to realize the utilization of resources.

## Results

According to the characteristics of "narrow and steep in the upper and middle reaches of the Yellow River," and wide and flat in the lower reaches ", the innovative device can divert and guide sand with the help of natural water force, so as to wash the beach area and improve the river course and river trend by" guiding sand ". At the same time, combined with the joint operation and operation of "low water level and large flow" of multiple reservoirs, strengthen the scouring strength of the siltation beach area, and wash the sediment of the beach area into the sea.

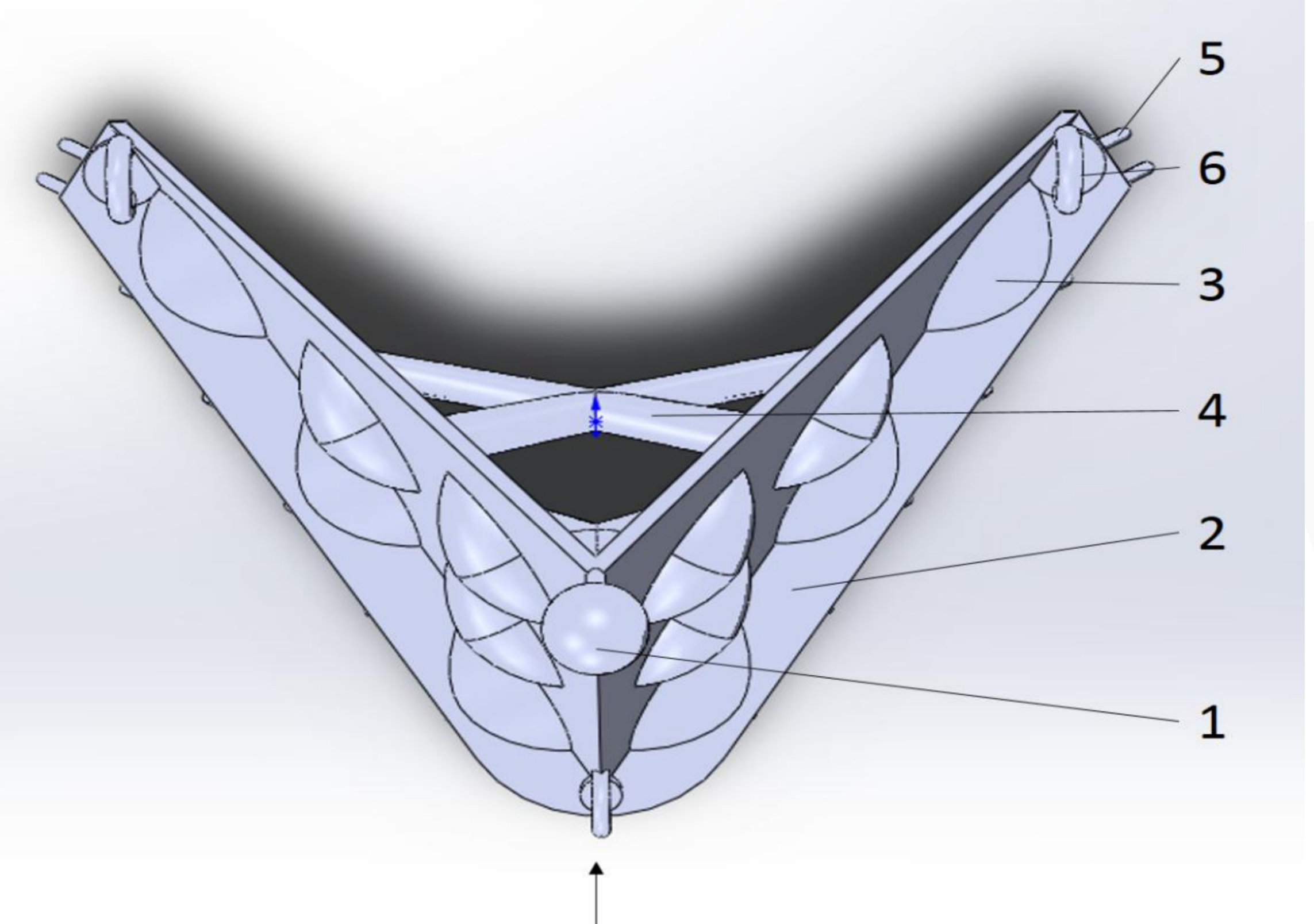


Figure 1 Conepered dredging device

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|---------------------|----------------------|------------------------|
| 1. Positioning ball | 2. Conical main body | 3. Wave pattern raised |
| 4. Support rod      | 5. Positioning pile  | 6. Hanging ring        |

## Conclusions

In addition to the Yellow River, the technology can be used in other rivers and reservoirs of similar kind. The flood discharge capacity will be improved in the river with severe sedimentation. In the main stream and tributaries of the reservoir with serious sedimentation, the reservoir capacity can be better restored, so as to improve the comprehensive benefit of the reservoir.

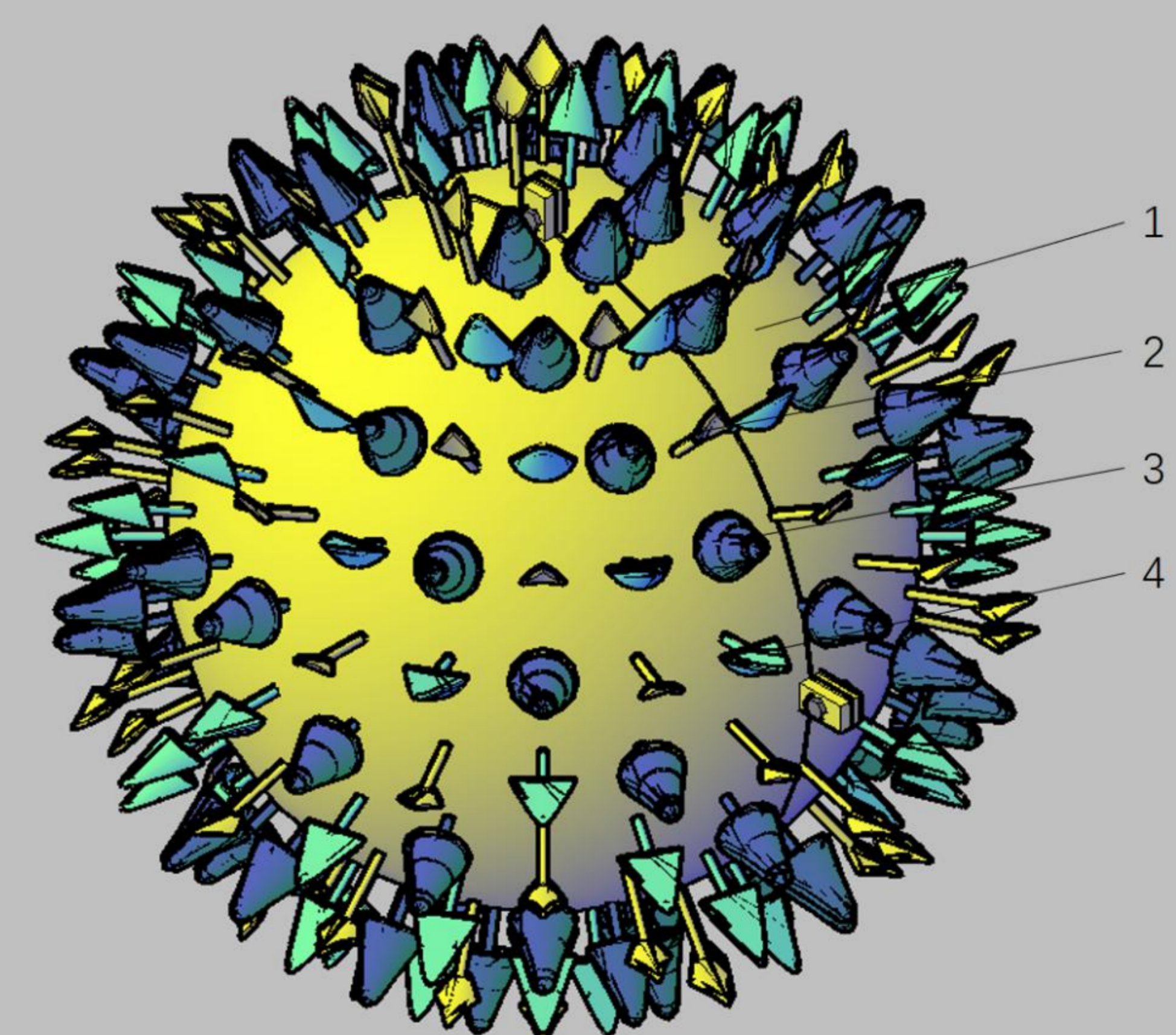


Figure 2 Spherical dredging device for sand disturbance

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|----------------------|----------------|------------------|-------------------|
| 1. Suspension sphere | 2. shovel unit | 3. umbrella unit | 4. Half-cone unit |
|----------------------|----------------|------------------|-------------------|