

Recasting Aquatic Designated Uses as Ecosystem Services in Clean Water Act Programs

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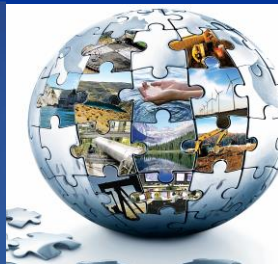
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The concept of Uses in the Clean Water Act

- CWA 101(a): “...where attainable, water quality which provides for the protection and propagation of fish, shellfish and wildlife, and recreation in and on the water” (*i.e., fishable, swimmable*)
- CWA 303 (c)(2)(a): water quality standards shall serve the purposes of the [Act] and **consider the use and value** for public water supplies, propagation of fish and wildlife, recreational, agricultural, industrial and other purposes



Uses form the centerpiece of regulatory water programs

- NPDES – point source discharge permits
- Water quality standards program
- Total maximum daily loads (TMDLs)
- Nonpoint source programs
- Ambient monitoring programs: 305(b), 303(d)



Examples of Uses and Associated Services

- Aquatic life protection; cold water fish propagation; salmonid spawning; etc. [fish for recreation and food]
- Contact recreation [recreation; aesthetics]
- Public water supply [drinking water]
- Agricultural water supply [water for crops]
- Industrial water supply [water for commercial activities]
- Navigation [shipping; boating/recreation]



Uses and Ecosystem Services

How do they compare?

Uses

- Goals for a waterbody
- Based on water quality but not entirely: e.g., flow and biological criteria
- Public has a say deciding uses for a waterbody
- Uses are largely provisioning services – not necessarily sustainable

Ecosystem Services

- Goals for a waterbody
- Based on integration of services/ecosystem processes not only water quality
- Public has a say deciding services for a waterbody
- Span many categories: provisioning, supporting, regulating, etc; **emphasis on services that are sustainable**



Different uses sometimes designated
without thought of how or whether they
can sustainably co-exist.



Designated aquatic life use, primary contact recreation, drinking water



Designated both warm and cold water aquatic life uses



Designated both agricultural water use and aquatic life use



**Some uses are not actually
defined but understood**



Designated aquatic life use but built for stormwater conveyance



Implementation of Uses is partially successful because:

- Depends only on **water quality** - insufficient
- Doesn't consider what's needed to truly maintain a given use — **regulating and supporting services**
- Only considers the **water and water-borne inputs**; doesn't extend to land uses, riparian habitat, other indirect controls [**outside of CWA**]



Regulating and Supporting Services Missing from CWA Programs

CWA

- Nutrient targets, criteria to control algae
- Pesticide criteria, benchmarks
- Permit limits, stormwater controls
- Stormwater conveyance engineering; green infrastructure

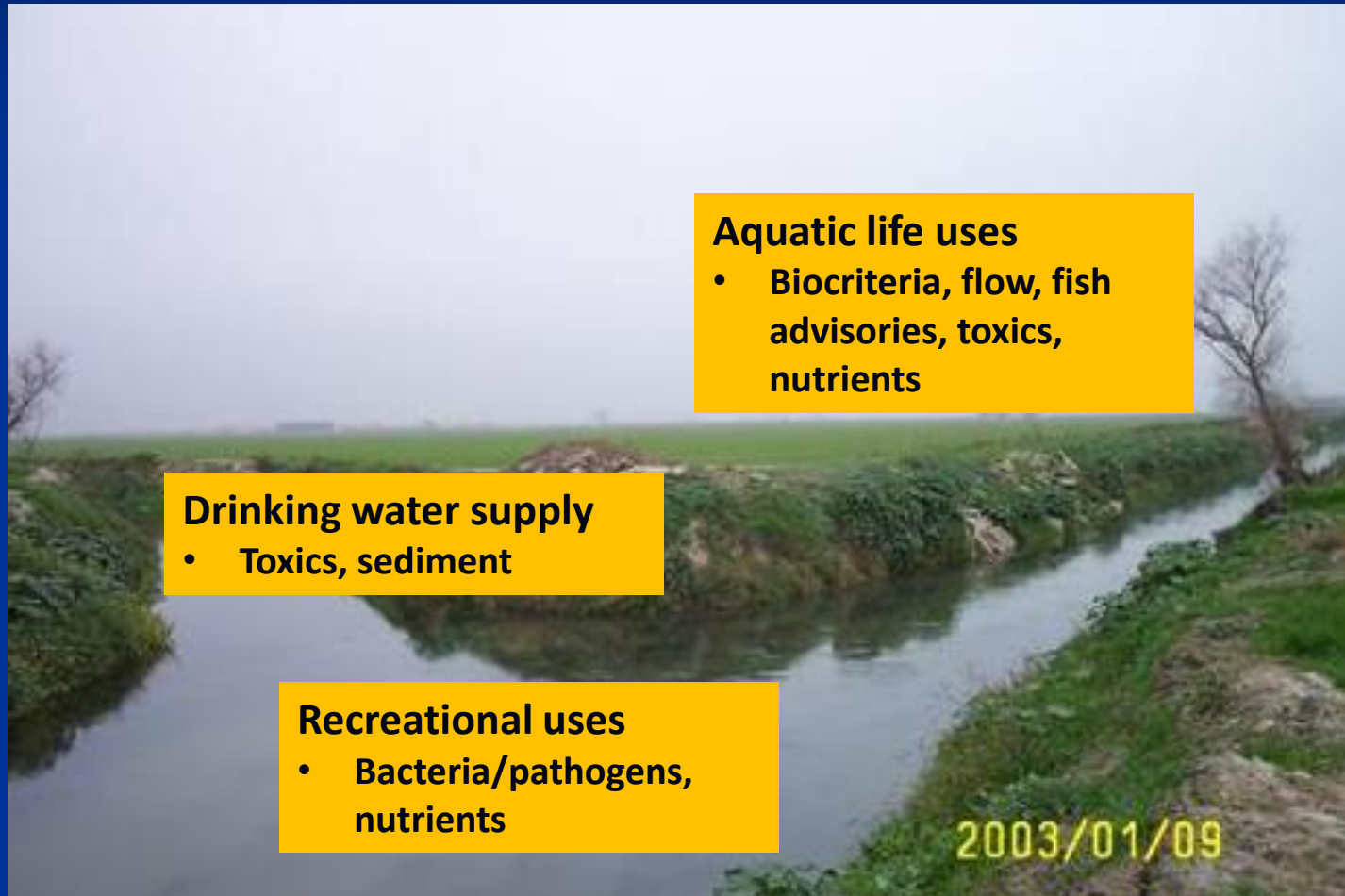
Ecosystem Services

- Primary production, nutrient cycling services
- Pest control services
- Water purification services
- Flood mitigation services

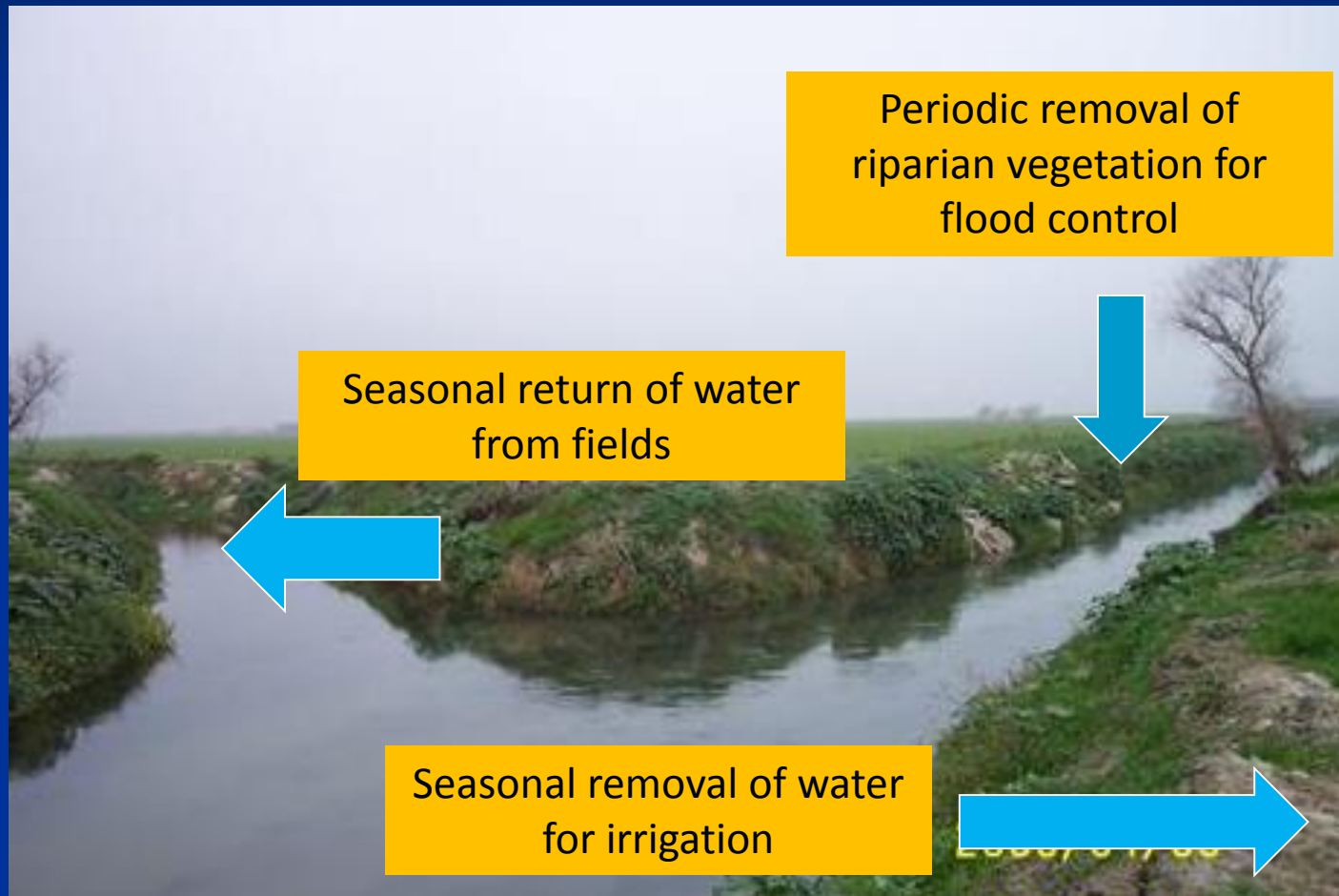


Example: Central Valley, CA

Agriculture-dominated



How is the waterbody managed?



Are uses being attained in this system?

- Aquatic life use is impaired
- Drinking water use unlikely due to large withdrawals of water seasonally and salts present naturally and otherwise
- Recreational uses very limited due to low water in summer/recreation period and poor aesthetics

But stream meets uses based on water quality standards



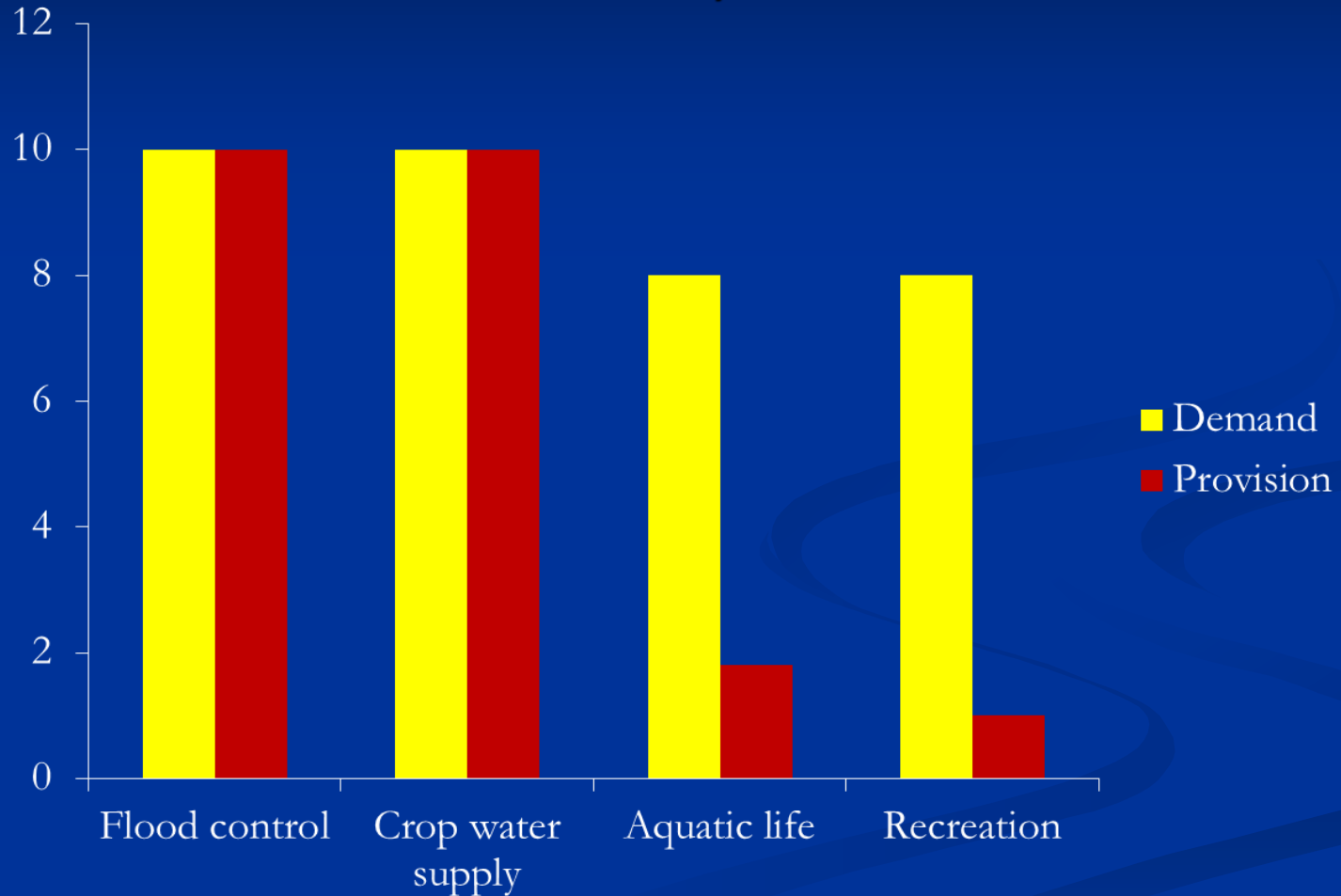
What if an ecosystem services approach was used instead?

- Use alternatives that retain stream habitat and enhance other services: **riparian buffers, green stormwater storage**
- Use alternatives that promote purification of water inputs (i.e., irrigation return): **riparian buffers, green stormwater storage, less crop water consumption, targeted use of crop chemicals**
- Consider withdrawal thresholds for irrigation and alternatives that reduce water consumption for crops: **more efficient crop watering, crops requiring less water**

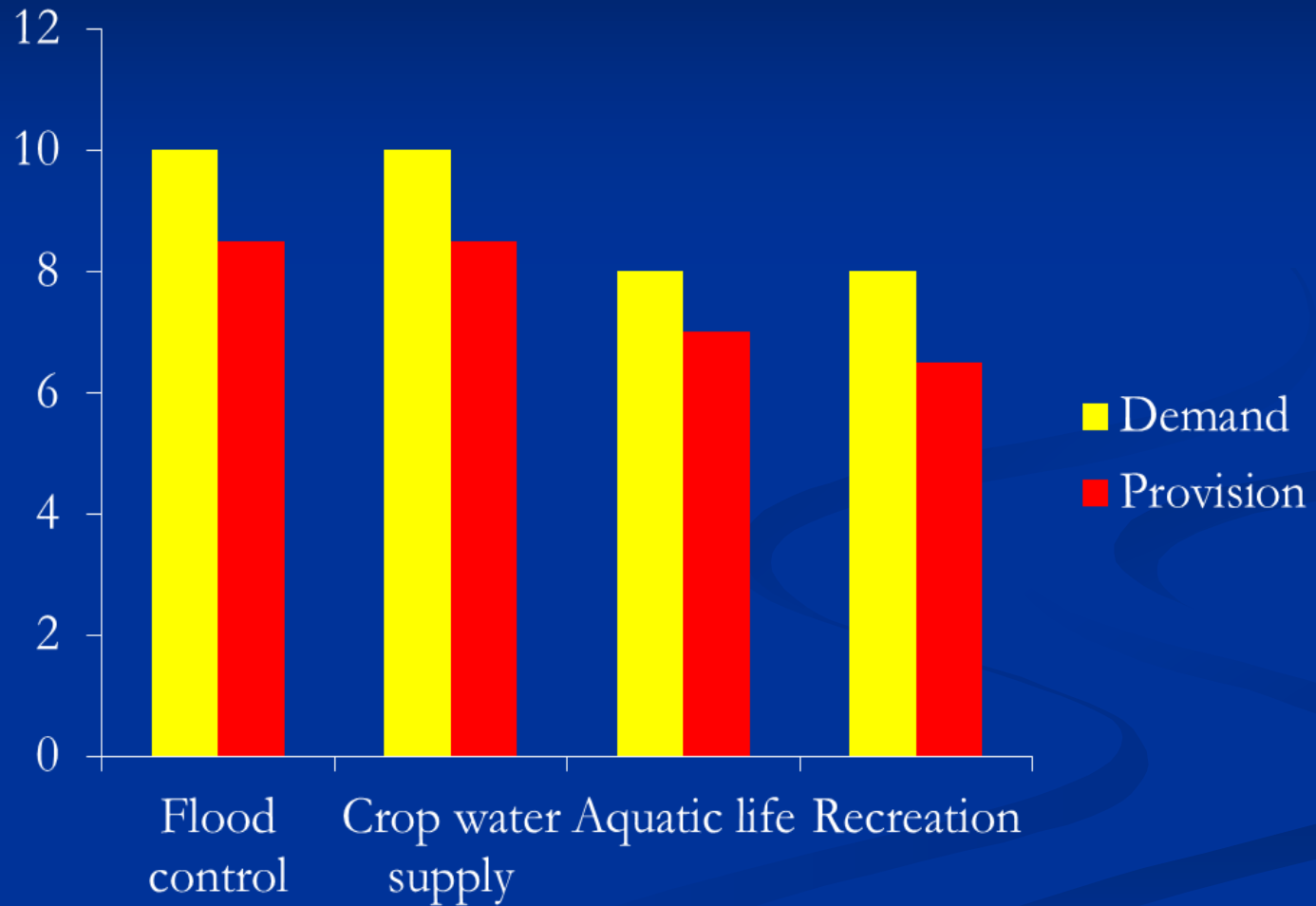


Evaluate Demand vs Attainment of Services

based on Maltby 2013



Using feasible alternatives



But what if the local “public” doesn’t care about ecosystem services other than the ones that serve their economic needs (i.e., agricultural supply and irrigation return conveyance)?



Should States/Tribes encourage
incorporation of ecosystem
services? Is that their role? How
would they accomplish this?



QUESTIONS??

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