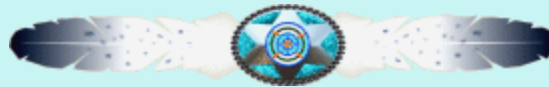
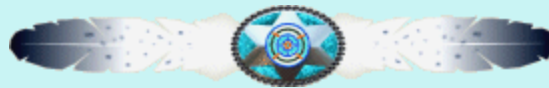


Valuing the Priceless: A Tribal Perspective on Quantifying Ecosystem Services



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And
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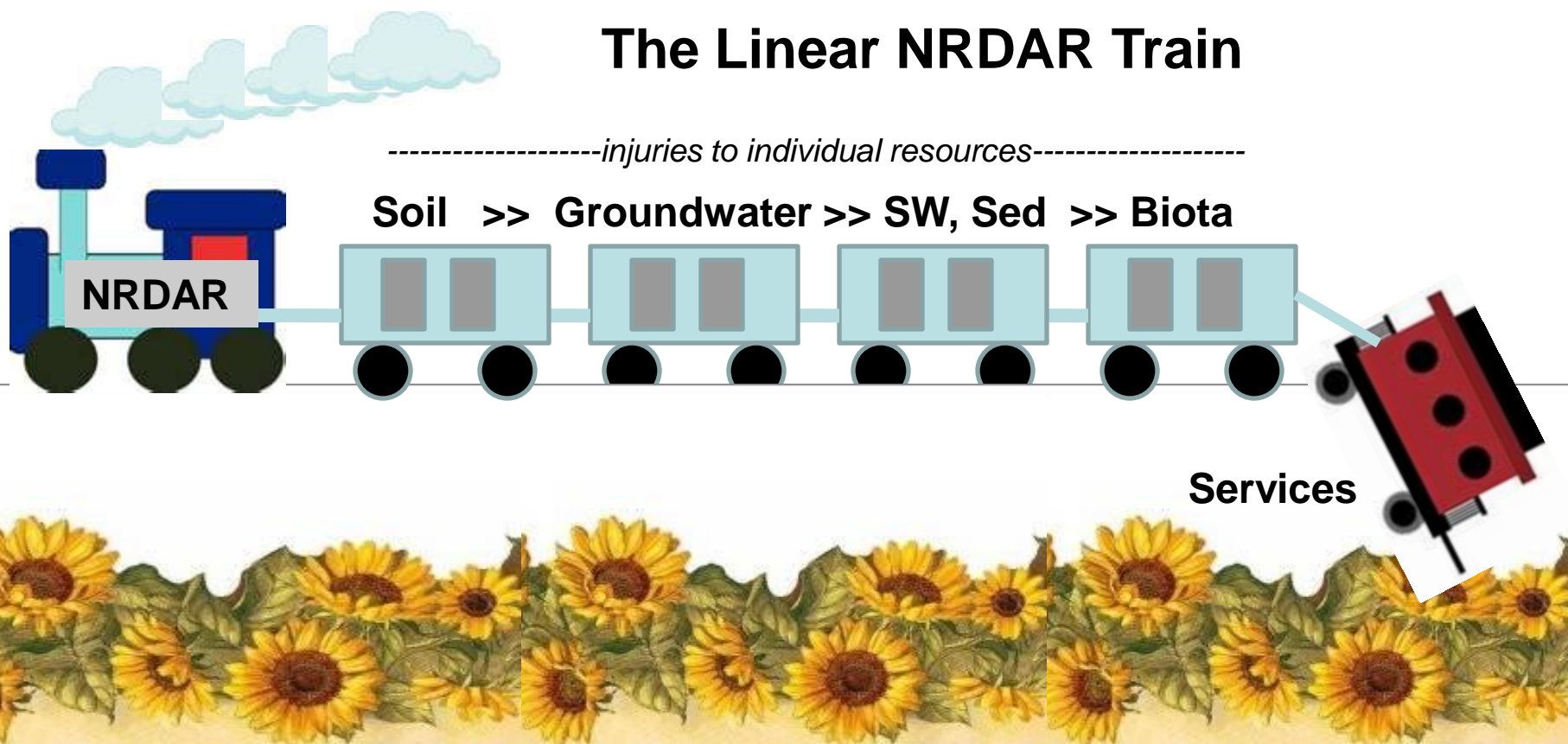


**ACES
Phoenix, December 9, 2010**

Context: Natural Resource Damage Assessment

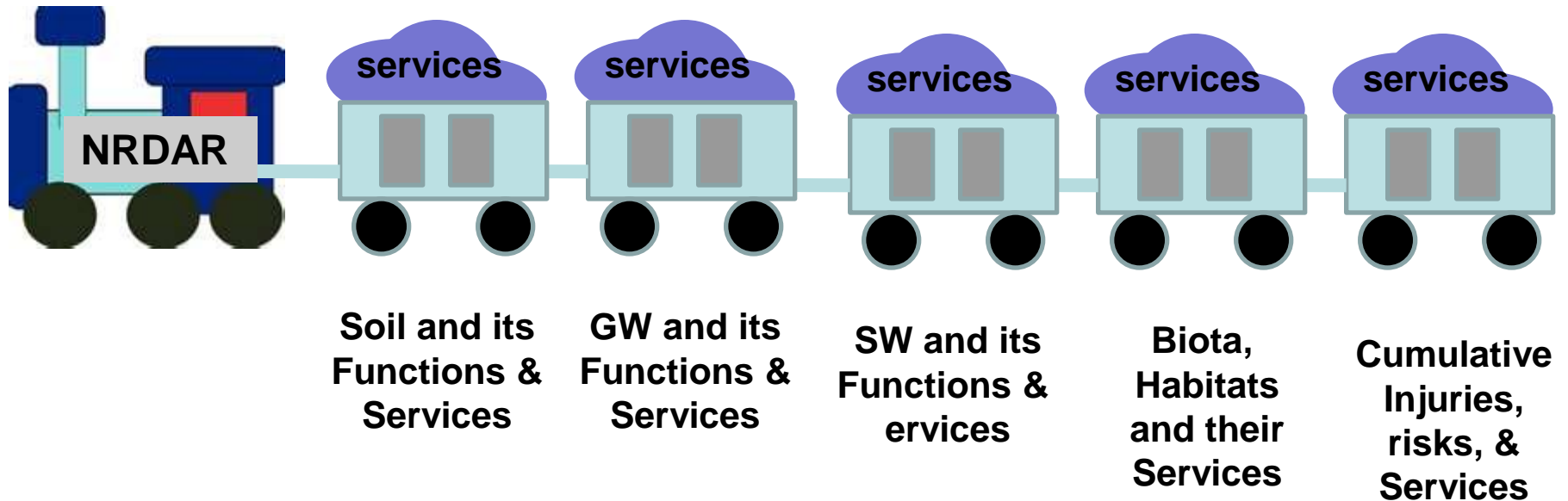
(Valuation and Restoration of injuries to natural resources and their lost use caused directly or indirectly by release and cleanup of hazardous substances – 43 CFR 11)

The Linear NRDAR Train



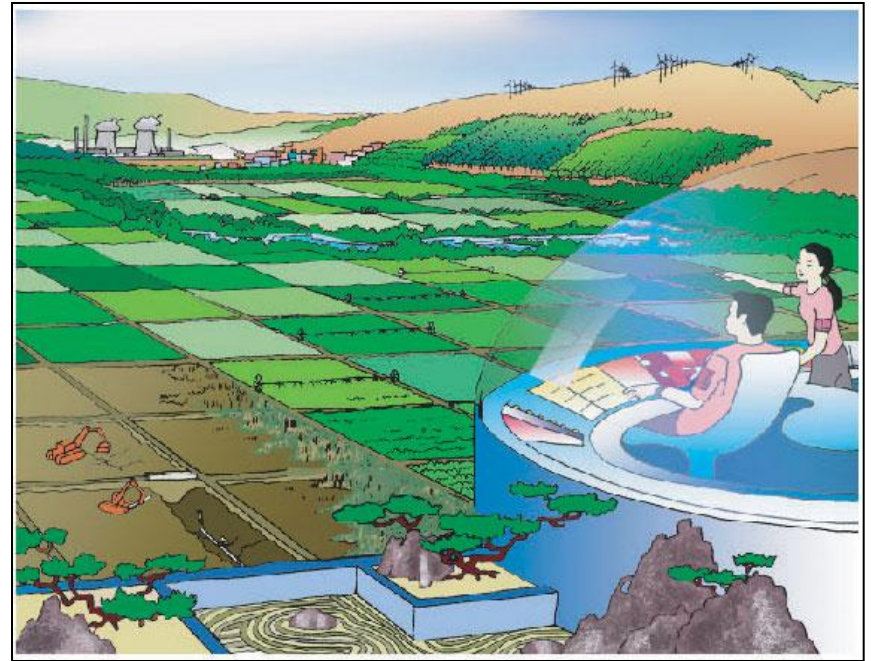
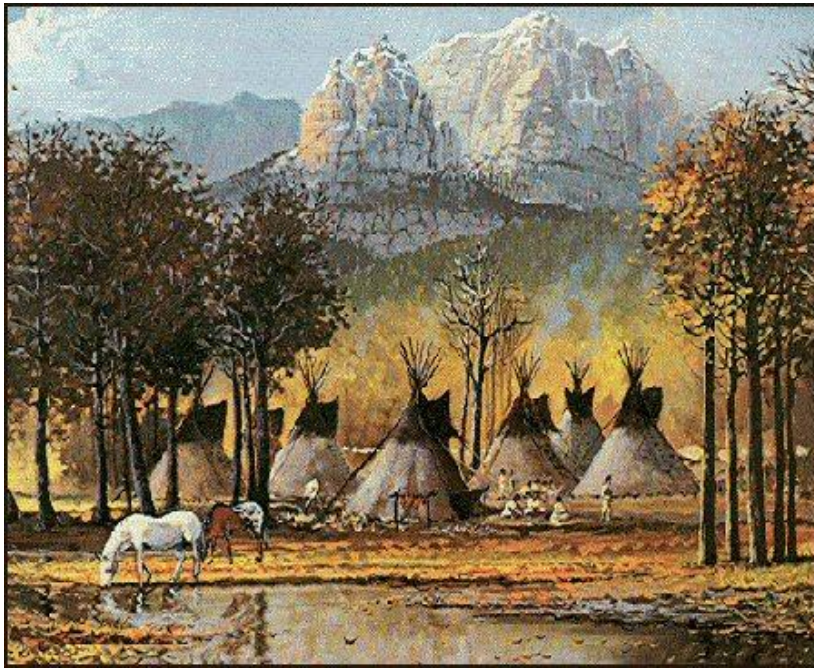
What the regulations actually say

Revised guidance emphasizes assessing and restoring “resources and their baseline levels of services” together.



Services refer to the physical and biological functions performed by the resource including **human uses** of those **ecological functions**. These services are the result of the physical, chemical, or biological quality of the resource. Final Rule on revisions to 43 CFR Part 11, October 2, 2008

*Not double counting – issue currently under discussion
Not just the quantification phase of NRDA; not just scaling*



*Ecosystem Services == People **IN** the ecology or just remotely extracting its services?
Services are not just a means to transfer utility among ecosystem components.*

Injury Determination. The revised regulations encourage the definition of **baseline services** before extensive quantification and valuation.

- A. Describe affected resources (like NEPA, but better)
- B. Describe services provided by baseline conditions of the site & resources
- C. Quantify reductions in services (narrative to fully quantitative metrics)
- D. Translate into currencies for each metric; normalize and sum.

**Revised guidance emphasizes restoring
“baseline levels of services.”**

“Services include provision of habitat, food and other needs of biological resources, recreation, or other products or services used by humans. They may be quantified by directly measuring changes in services provided by the resource, instead of quantifying the changes in the resource itself.” (43 CFR 11, various sections).

“Cultural, religious, and ceremonial losses that rise from the destruction of or injury to natural resources continue to be cognizable under the revisions.”

Examples of service loss (43 CFR 11.62 and .71)
Issue of “going beyond” the 1980 definitions

- Exceedance of human **health/risk-based standards** such as drinking water standards or ambient water quality standards. (43 CFR 11.62(b))
- Exceedance of **human health/risk-based action or tolerance level** [most common example is a fish advisory; tribal uses of NR are more intensive and require specific CERCLA exposure **scenarios**].
- “**use is restricted** as a result of the discharge or release.”
[also a health/risk-based CERCLA determination.]
- “Determine the services normally produced by the injured resource, which are considered the baseline services or without-a-discharge-or-release condition.”
- “Identify **interdependent services**to discover significant **secondary services** that may have been disrupted by the injury.”

Regional Tribal subsistence exposure scenarios

- (1) Describes how resources would be used if uncontaminated and fairly undegraded. Not necessarily contemporary average.
- (2) Describe eco-cultural zones (the environmental setting, EPA Ecoregion levels of PNV) and natural resource usage patterns;
- (3) Reconstruct the original local subsistence diet;
- (4) General and unique tribal exposure pathways such as hunting, gathering, making material items, fishing;
- (5) Identify direct exposure factors (activities and their frequency, duration and intensity, and resource use) in a CERCLA-style format for use in baseline risk assessment (absent restrictions).



**Excess risk =
service loss**

*Umatilla
seasonal
round*

Examples of Services to Tribes Provided by Natural Resources (Clean & Restored)

- * Support of holistic traditional life, lifeways, and heritage activities
- * Subsistence fishing, hunting, and gathering (injured if contaminated and risk is high & use is restricted – as shown by scenario);
- * Landscape quality; Intact landscapes for places, names, songs, calendars, linguistic landmarks, sacred geography, place-based ceremonies. Recognition of landscape as ethno-habitat with eco-cultural attributes.
- * Ecosystem metrics – contiguous size, refugia, biodiversity, etc. Individual resources identified as cultural keystone species.
- * Education associated with place-based stories, names, history, practices, skills, language words, heritage fishing sites;
- * Education about plant identification, salmon work, medicines;
- * Stewardship, resource management and restoration work;
- * Clean and safe resources (lack of excessive exposure) and active multi-dimensional health promotion within traditional lifeways;
- * Benefits of wild foods, or deficits due to lost foods;
- * Wilderness, solitude, quiet, dark for meditation or ceremony;
- * Promises kept, respect for rights, federal fiduciary trust, environmental justice, intergenerational equity, capacity building, etc.

Examples of Ecological Functions and Services Provided to Biota and People – Millenium Assessment

Supporting Services:

- Nutrient cycling
- Pollination
- Soil formation
- Habitat

Regulating Services:

- Climate regulation
- Disturbance regulation
- Water regulation
- Waste treatment hosting

Provisioning Services:

- Food production
- Raw materials
- Genetic resources
- Medicine resources

Other Human Services:

- Recreation
- Aesthetics
- Existence
- Science/Education
- many additional

Security:

- Personal safety
- Secure resource access
- Security from disasters

Basic material for good life:

- Adequate livelihood
- Adequate nutritious food, natural medicines
- Shelter
- Access to goods

Health:

- Affirmative well-being
- clean water, air, food
- Minimal stressors

Social-Economic-Education

- Social cohesion
- Mutual respect
- Ability to help others

**Constituents
of Well-Being
(and
homeland
security)**

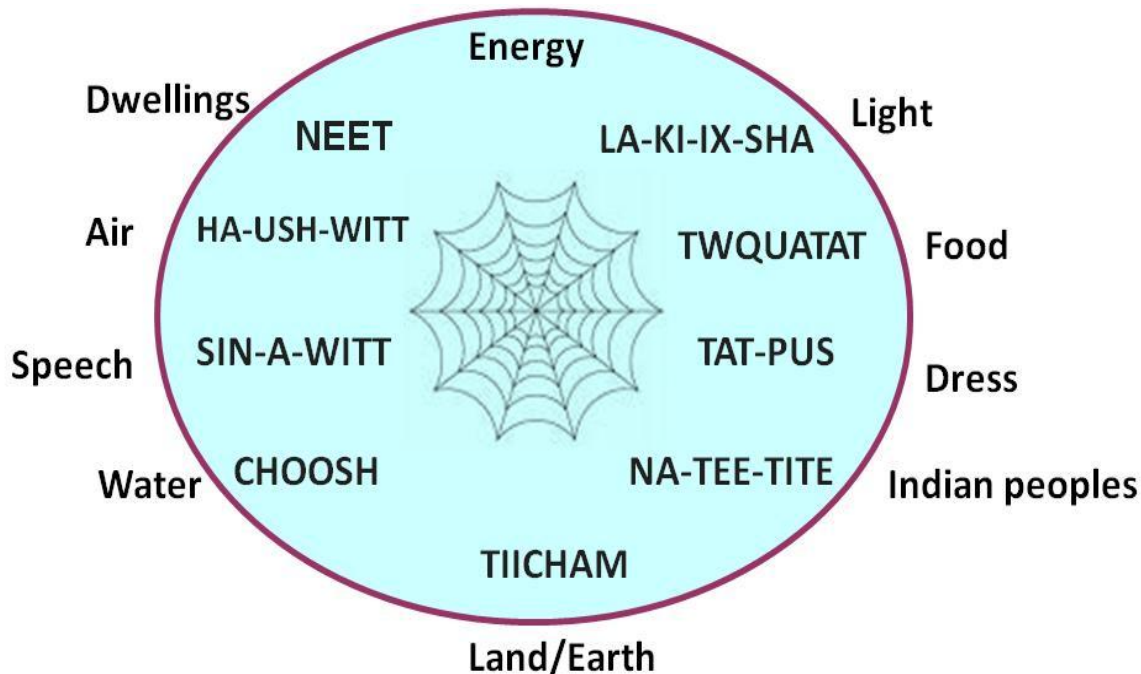
Freedom of Action and Choice

- Opportunity
- Values
- Doing
- Being

(Too linear)

Tamánwit (natural law)

- Ties First Foods and serving order to the landscape
 - Reflects explicit Treaty-identified resources
- Guides research into ecological process and restoration
 - World View – TEK – Ways of knowing and relating,
 - Ways of valuing and establishing worth

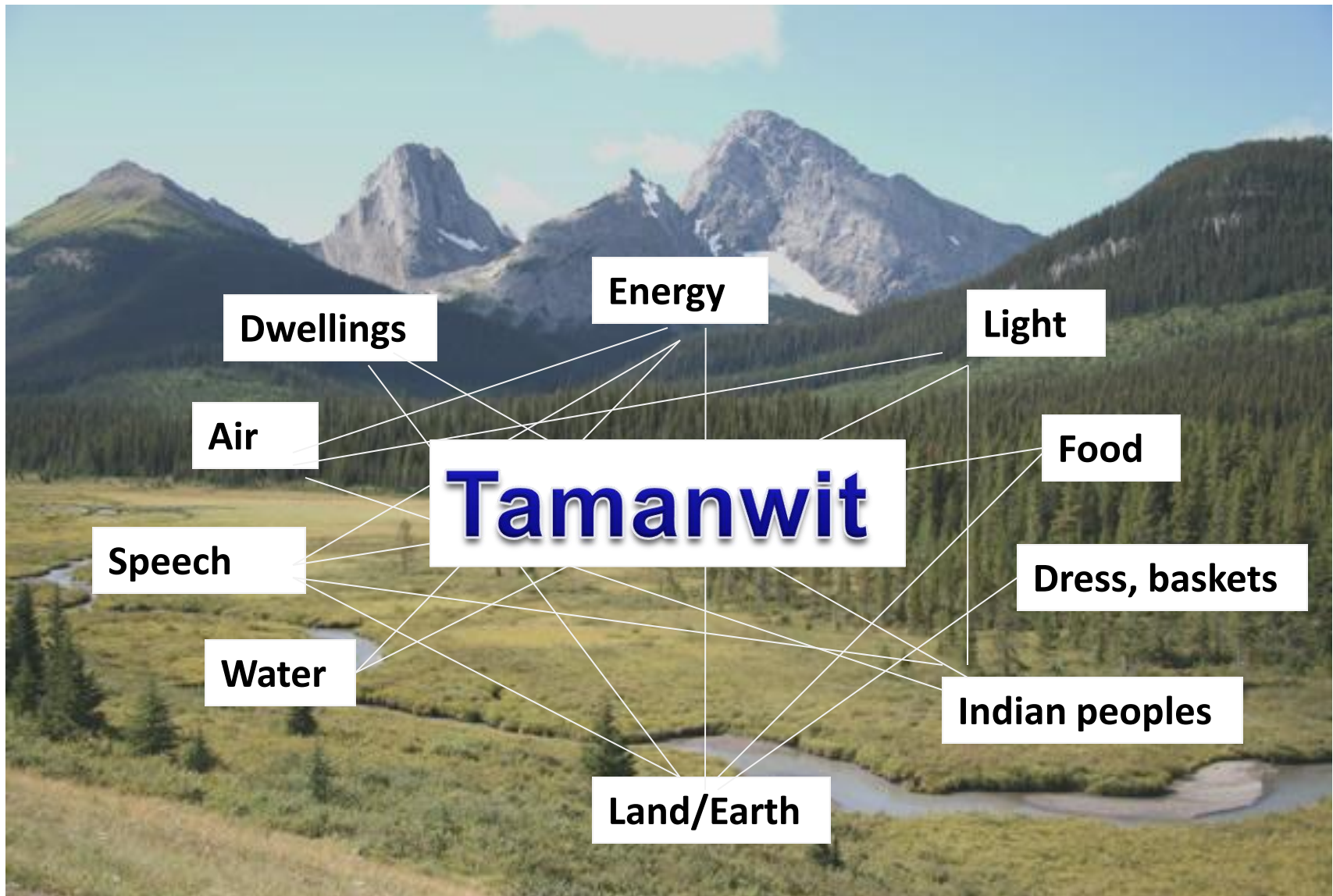


Cultural keystone species
are not simply nutritious.
They feed the body & feed
the spirit

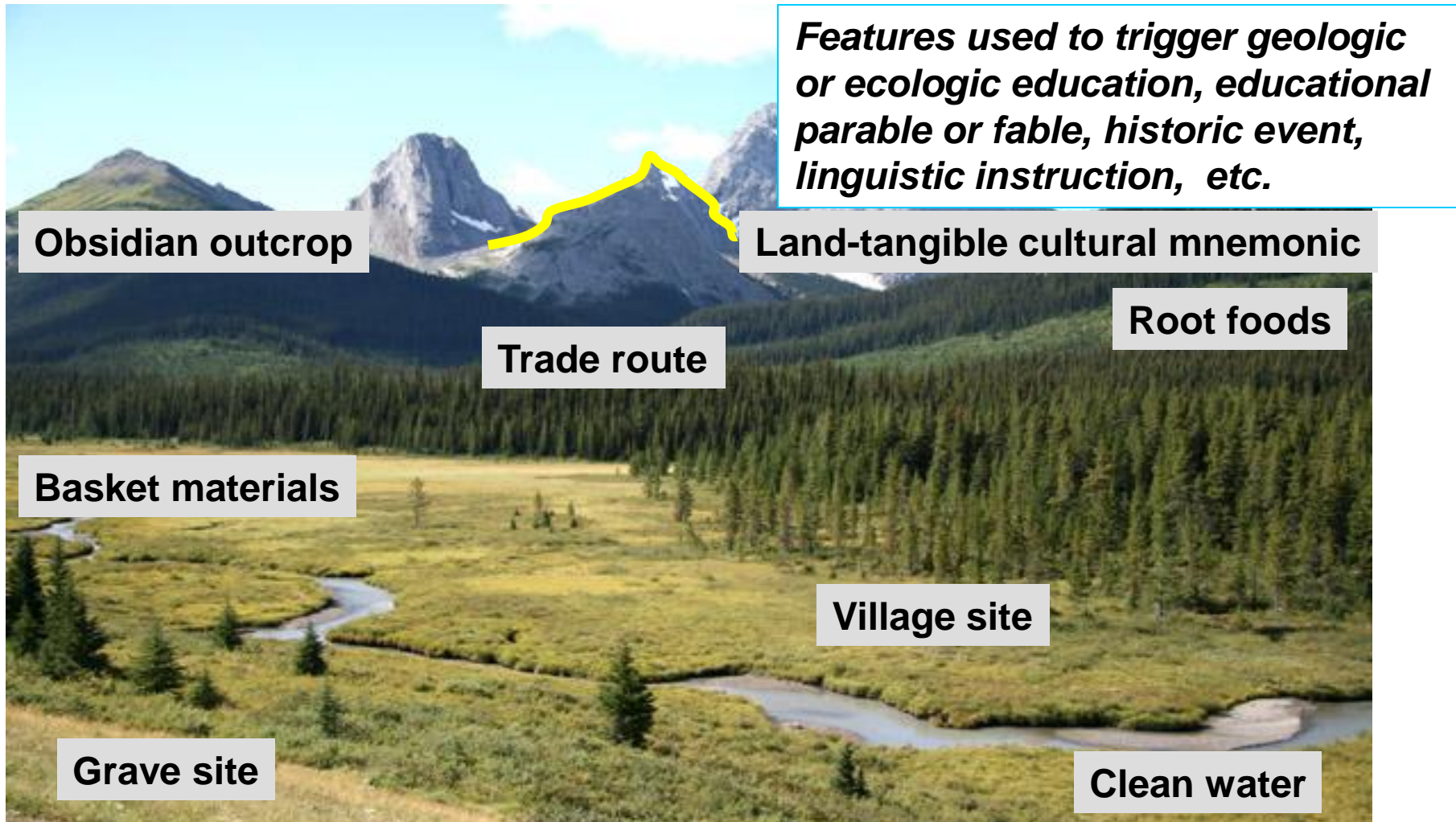
First Foods

Water
Fish (salmon,
lamprey, mussels)
Game (elk, deer)
Roots (cous, camas,
bitterroot)
Berries (huckleberry,
chokecherry)

Health means **healthy people** in a **healthy environment** participating with the community in an eco-cultural system following natural laws in seamless cycles. Ecosystems and natural resources have many eco-cultural attributes.



Define services while planning a response action or mitigation project
Notice the services & eco-cultural attributes of the ethnohabitat.



Possible Metrics for Quantifying Loss of Human Services and Tracking Recovery of Services relative to Baseline (there are lots of things to count)

- In addition to economic methods such as conjoint etc----
- Risk-acres (target risk level plus Tribal exposure scenarios)
- Spatial service-acre-years (weighted by importance) or gallon-yrs or acre-ft or viewshed degrees or habitat level, etc. Non-discounted depending on duration of injury (e.g., 10,000 years).
- Landscape ecology, large-scale metrics, indices for fragmentation and diversity related to human utility. Cultural HEA. Equity analysis to regain parity and reduce disparities in impacts.
- Constructed scales (numbers of lost visits to TCP, universal harm scale, other community surveys, etc.)
- Tribal QALY-DALY-QOL, cultural keystone species
- Dependency webs to identify users, uses, and linkages



Valuation in Eco-cultural systems & subsistence economies

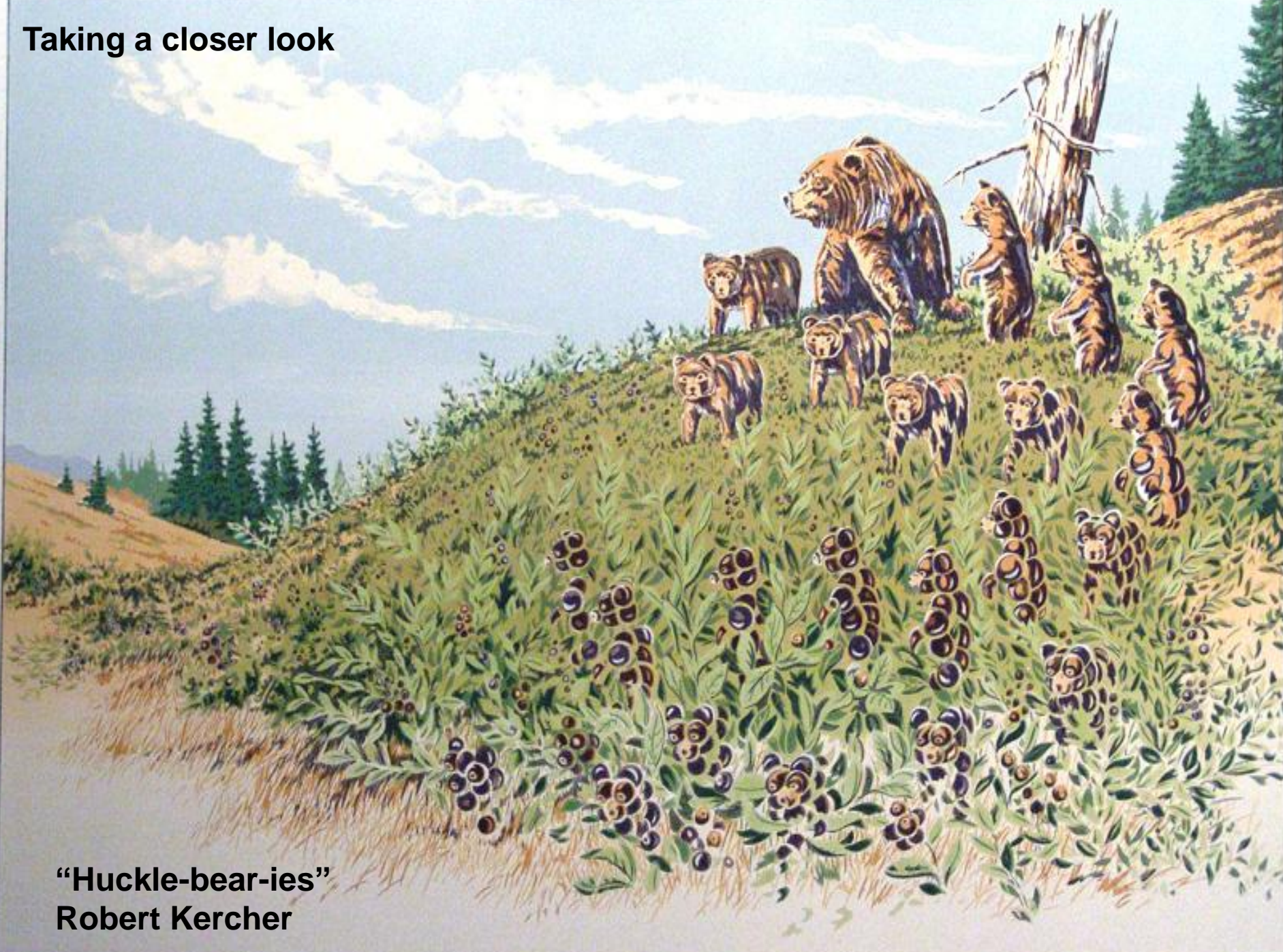
Economic systems determine how materials, services, and information flow within the community and between the environment and the community. In western populations these service flows are quantified in the symbolic form of dollars or other trusted and agreed-on exchange systems.

- **WTP will not work for people without much money or for values such as freedom, flag, family.**
- **WTA – willingness to accept does not work for people who are used to having things taken with no recompense – anything is better than nothing, so people settle for far less than real value.**
- **However, WTD – willingness to die for applies to homeland protection. Conviction rather than simple belief.**

Indigenous currencies include:

- Ordinary dollars, jobs, goods,
- Materials and goods with labor-based value (attributes of skill, effort, scarcity),
- Interlinked networks of reciprocity, obligation, trust (elders as accountants),
- Knowledge of places, historians, stories as education and entertainment,
- Linguists (words embed relational meaning, biosemiotic information).
- Special skills
 - problem-solving (indigenous science – problem formulation, experimental design, observation, hypotheses, testing, analysis, dissemination of results; enabled survival for many thousand years)
 - teachers, healers, organizers, artists, defense (war chiefs, lawyers)
 - resource managers that regulate harvest, water quality, prescribed burning, salmon chiefs, quarry managers, resource distribution, etc.
- Fairness in adjudication, appropriate levels of sharing (not same as western)
- These kinds of wealth build status and power just as dollars do.

Taking a closer look



**“Huckle-bear-ies”
Robert Kercher**