**Integrity**

/inˈteɡrəti/

noun

1. The quality of being honest and having strong moral principles; moral uprightness.
   "He is known to be a man of integrity"
   synonyms: honesty, probity, rectitude, honor, good character, principle(s), ethics, morals, righteousness, morality, virtue, decency, fairness, scrupulousness, sincerity, truthfulness, trustworthiness
   "I never doubted his integrity"
   antonyms: dishonesty

2. The state of being whole and undivided.
   "Upholding territorial integrity and national sovereignty"
   synonyms: unity, unification, coherence, cohesion, togetherness, solidarity
   "The integrity of the federation"
   antonyms: division

• The condition of being unified, unimpaired, or sound in construction.

**Desire**

/deˈzīr(e)/

verb

past tense: desired; past participle: desired

Strongly wish for or want (something).
"He never achieved the status he so desired"
    synonyms: want, wish for, long for, yearn for, crave, hanker after, be desperate for, be bent on, covet, aspire to; More

**Condition**

/kənˈdɪʃ(ə)n/

noun

1. The state of something, especially with regard to its appearance, quality, or working order.
   "The wiring is in good condition"
   synonyms: state, shape, order
   "Check the condition of your wiring"

• A person's or animal's state of health or physical fitness.
   "He is in fairly good condition considering what he has been through"
   synonyms: fitness, health, form, shape, trim, fettle
   "She was in top condition"

• An illness or other medical problem.
   "A heart condition"
assessment
/əˈsesmənt/  
noun
noun: assessment; plural noun: assessments

the evaluation or estimation of the nature, quality, or ability of someone or something.
"the assessment of educational needs"

synonyms: evaluation, judgment, rating, estimation, appraisal, analysis, opinion

More
Desired conditions?

Need to identify reference or ‘desired condition’ sites and measure over time

How to quantify, monitor, and set measurable goals?

Quantify reference conditions in a range of valley and channel types
Scale

Region

Segment

Reach

Ecoregion

Valley Form

Channel Type

Riparian Area
Geomorphic Valley Classification
E. Carlson and B. Bledsoe

1) System energy
2) Valley confinement
3) Hillslope coupling

<table>
<thead>
<tr>
<th>Geomorphic Valley</th>
<th>Energy Level</th>
<th>Confinement</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headwater</td>
<td>&gt; 4%</td>
<td>Confined</td>
<td>Steep</td>
</tr>
<tr>
<td>High-energy Coupled</td>
<td>&gt; 4%</td>
<td>Confined</td>
<td>Steep</td>
</tr>
<tr>
<td>High-energy Open</td>
<td>&gt; 4%</td>
<td>Unconfined</td>
<td>Steep</td>
</tr>
<tr>
<td>Moderate-energy Confined</td>
<td>0.1 - 4%</td>
<td>Confined</td>
<td>Low-Steep</td>
</tr>
<tr>
<td>Moderate-energy Unconfined</td>
<td>0.1 - 4%</td>
<td>Unconfined</td>
<td>Low-Steep</td>
</tr>
<tr>
<td>Canyon</td>
<td>Variable</td>
<td>Confined</td>
<td>Steep</td>
</tr>
<tr>
<td>Gorge</td>
<td>Variable</td>
<td>Confined</td>
<td>Steep</td>
</tr>
<tr>
<td>Glacial Trough</td>
<td>&lt; 4%</td>
<td>Unconfined</td>
<td>Moderate-Steep</td>
</tr>
<tr>
<td>Low-energy Floodplain</td>
<td>&lt; 0.1%</td>
<td>Unconfined</td>
<td>Low-Moderate</td>
</tr>
</tbody>
</table>
Hydrogeomorphic valley classification
Erick Carlson and Brian Bledsoe
Colorado State University

Hydrogeomorphic valley type
GOR CAN GLA LEF HEO MEC MEO HEC
Proportion of stream length
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
Rio Grande National Forest

Valley Class
- Canyon
- Glacial
- Gorge
- High Energy Coupled
- High Energy Open
- Low Energy Floodplain
- Medium Energy Confined
- Medium Energy Open

Hydrogeomorphic valley classification
Erick Carlson and Brian Bledsoe
Colorado State University
Project-level monitoring

Inference at different scales

Field data collection and analysis tools
Riparian vegetation monitoring:

- Plant species composition and vertical structure
- Tree stem density, basal area, and condition

Scott et al. 1999
• Channel cross sections and fluvial
  Classification
  Width to depth
  Form

• Reach longitudinal profile
  Gradient
  Longitudinal profile

• Substrate characterization
  Bare soil, gravel, cobble, boulder, bedrock, water

Combined:
  • Opportunity for trend monitoring
  • Ability to hydraulically model to develop rating curves
  • Measurable attributes of desired or reference conditions
Threats or stressors to riparian and wetland systems:
- Changes in flow regime and dewatering (supply and demand-driven)
- Channelization
- Invasive species
- Changes in sediment delivery to channel
- Herbivory
- Wildfire and fuels

http://www.fs.fed.us/wwetac/projects/theobald.html
Also see Poff et al. 2011. AWRA.
<table>
<thead>
<tr>
<th>Threat</th>
<th>Examples of causes</th>
<th>Examples of effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Changes in flow regime† and dewatering</td>
<td>Surface water: dams, diversions, changes in land-use, climate change; groundwater: pumping, land use change, climate change</td>
<td>Water stress of vegetation, shifts in plant species composition, homogenization of riparian zone, simplification of biota, isolation of floodplain from stream, changes in stream-riparian organic matter exchange and trophic dynamics, alteration of floodplain biogeochemistry terrestrialization, secondary effects (fragmentation, channel change)</td>
</tr>
<tr>
<td>Channelization</td>
<td>Bank hardening, levee construction, structural changes in channel - - deepening, berm development, meander cutoff</td>
<td>Isolation of floodplain from stream, changes in fluvial processes, changes in hydraulics (aquatic habitat and channel forms), alteration of floodplain biogeochemistry</td>
</tr>
<tr>
<td>Invasive species</td>
<td>Introduction, altered processes in system that facilitate establishment &amp; spread (e.g., herbivory, changes in flow regime)</td>
<td>Displacement of native species, formation of monoculture, changes in site characteristics (e.g., biogeochemistry, soil characteristics, changes in water balance), shifts in community composition, changes in habitat structure</td>
</tr>
<tr>
<td>Changes in sediment delivery to channel</td>
<td>ORV use, roads (drainage, gravel application), livestock/herbivore trampling, changes in vegetative cover in watershed and/or along channel, direct mechanical impacts to channel, dams, and diversions</td>
<td>Shifts in channel and floodplain form (through increased or decreased sediment delivery to channel), changes in channel processes, incision/aggradation</td>
</tr>
<tr>
<td>Herbivory</td>
<td>Domestic grazing, wild herbivores (predator control)</td>
<td>Bank trampling, compaction, vegetation changes (cover, composition), stream capture, nutrient inputs</td>
</tr>
<tr>
<td>Wildfire and fuels</td>
<td>Fuel buildup from invasive species, fire suppression, decadent vegetation, flood suppression, lack of flooding-slower decomposition of organic material</td>
<td>Increases in frequency and intensity of fires, loss of fire intolerant taxa, changes in the structure of riparian vegetation and habitat quality and distribution, subsequent shifts in biota</td>
</tr>
</tbody>
</table>
Threats assessment considers factors that influence riparian and riverine functioning:

- Flow regime
- Sedimentation
- Lateral Connectivity

http://www.fs.fed.us/wwetac/projects/theobald.html
Modeled past, present, and projected future conditions

Examined the current status of streams relative to unaltered reference conditions

Evaluated those riparian areas most at risk of future change under various future scenarios of climate change and human caused land cover change.

http://www.fs.fed.us/wwetac/projects/theobald.html
Current threat level
Green = Low
Red = High
IPCC A1B
IPCC B1