Recovery Potential Metrics
Summary Form

Indicator Name: CORRIDOR PERCENT U-INDEX

Type: Stressor Exposure

Rationale/Relevance to Recovery Potential: Both riparian and watershed-wide U-index (anthropogenic) land cover patterns are associated with benthic macroinvertebrate communities that are tolerant of stream degradation, indicating a lower level of aquatic ecological integrity and water quality. As the intensity of human activities increase there is a tendency that the biological integrity of the rivers decreases. Increasing substrate embeddedness and bank erosion have also been observed to increase in streams in developing areas. High riparian U-index may indicate that, as widespread anthropogenic cover is unlikely to be reduced and is complex to remediate, U-index may be a strong determinant of poor recovery prospects.

How Measured: Extracted from land cover mapping within a set corridor width, and summarized as % anthropogenic cover types (e.g. developed, agricultural) by area within the corridor.

Data Source: Land cover data can be used to determine anthropogenic cover types but may be outdated in rapid growth areas. Sources include the National Land Cover Data from 1992 (See: http://www.epa.gov/mrlc/nlcd.html), 2001 (See: http://www.epa.gov/mrlc/nlcd-2001.html) and 2006 (http://www.mrlc.gov/nlcd06_data.php), as well as various state sources. This metric can also be measured with a narrow corridor width or as a linear feature to identify specifically the land-water interface proportions that are in human-altered cover types

Indicator Status (check one or more)

_____ Developmental concept.
___x__ Plausible relationship to recovery.
_____ Single documentation in literature or practice.
___x__ Multiple documentation in literature or practice.
_____ Quantification.

Status/Comments: Operational, with wide applicability to flowing waters in all regions.

Examples from Supporting Literature (abbrev. citations and points made):

- (Potter et al 2004)The resulting vulnerability models indicate that North Carolina watersheds with less forest cover are at most risk for degraded water quality and stream habitat conditions. Studies have found strong positive relationships between diverse assemblages of stream benthic macroinvertebrates that are intolerant of water quality degradation and watershed-wide forested land cover (Lenat and Crawford 1994, Stewart and others 2001, Weigel and others 2003) or forested land cover within riparian zones (Basnyat and others 1999, Sponseller and others 2001, Stewart and others 2001, Weigel and others 2003). Meanwhile, research has shown less diverse and more intolerant macrobenthic communities to be correlated with agricultural land cover (Lenat and Crawford 1994, Richards and others 1996, Weigel and others 2000, Genito and others 2002) and urban land use (Lenat and Crawford 1994, Morley and Karr 2002, Morse and others 2003, Roy and others 2003, Volstad and others 2003, Wang and Kanehl 2003).
- (Potter et al 2004) Two of the three watershed land cover variables — percent agricultural and percent forested — exhibited somewhat strong relationships. The percent of agriculture land cover at the watershed scale had a positive relationship with the indices, meaning that it was negatively correlated with aquatic ecological integrity. The percent of forest was correlated with better stream conditions. In our statewide analysis,

the percent of forest cover at the watershed scale and in riparian zones were highly correlated enough (0.776) that the two have similar value as predictors of macroinvertebrate tolerance for water quality degradation. Forested land cover, at both the watershed and riparian scales, was a statistically significant predictor of benthic macroinvertebrate communities that are less tolerant of stream degradation, and that indicate a greater level of aquatic ecological integrity and better water quality. The opposite was the case for agricultural land cover at the watershed and riparian scales, and developed land cover in riparian zones.

- (wang 2001) The results shown in Table 5 indicate that the land-use components within the catchments could be major predictors for biotic integrity. The percentage of urban land was the second strongest predictor for both IBI and ICI. The negative signs of those coefficients indicate that as the intensity of human activities increase there is a tendency that the biological integrity of the rivers decreases. The percentage of wooded land was the third strongest predictor for IBI.
- (ourso and frenzel 2002) Increasing substrate embeddedness and bank erosion have been observed to increase in developing areas (Arnold et al., 1982; Furniss et al., 1991)
- (wang 2001) After statistically analyzing the spatial patterns of the water quality in receiving rivers and land uses and other point pollution sources in the watershed, the results showed that the water biotic quality did not degrade significantly below wastewater treatment plants. However, significantly lower water quality was found in areas downstream from high human impact areas where urban land was dominated or near point pollution sources.