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Developing a Set of Sustainability Indices for the State of Oregon

A Progress Report to the Oregon Progress Board

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Introduction

The purpose of this research was to identify a set of existing Oregon Benchmarks that are useful for measuring sustainability. The primary outcome was a set of indices depicting three domains of sustainability: economy, community and environment. The development of three indices allows for a comparison of the trends depicted in each index. A secondary element of the research was the identification of additional indicators beyond the current set of Benchmarks that might assist the Progress Board in presenting a more detailed picture of statewide sustainability.

The research approach used two methods to evaluate the Oregon Benchmarks as measurements of sustainability: 1) a comparison between the Oregon Benchmarks and national and international sustainability indicator programs, and 2) a survey of sustainability experts requesting that the experts rate each of the Oregon Benchmarks for usefulness in assessing statewide sustainability.

The final results of this research will be available in August 2002 in Adam Zimmerman's Master Thesis, "Evaluating the Oregon Benchmarks as a Basis for Developing Sustainability Indices."

Index development

The four criteria in Table 1 were used to identify the Benchmarks that are most useful for measuring sustainability. Benchmarks with a score above 2.0 (out of a possible 6.0) were considered for the indices. The scores for each Benchmark were based on the results of the comparison to other sustainability indicator programs and the responses from the expert survey. The Benchmarks were then separated into three groups: economy, environment and community.

Table 1: Benchmark Selection Criteria

Criteria	Possible Criteria Score
1. Valued in field of sustainability indicators	1.5
2. Highly rated by sustainability experts	1.5
3. Broad coverage of sustainability issues	1.5
4. Consistent with OPB values	1.5
Total Possible Score	6 / 6

Overall, when compared to other sustainability indicator programs, the Benchmarks have excellent coverage in the areas of social support, and public safety, adequate to good coverage in the areas of economy, education and civic engagement, and relatively weak coverage in the areas of community development and environment. Responses to the expert survey indicated that experts consider environmental and community development Benchmarks most important for measuring sustainability.

Index Results

The indices developed for this project include 35 of the existing Benchmarks. The limited size reduces the level of complexity and improves capacity to quickly understand the driving factors in each index. Table 2 displays the 35 Sustainability Benchmarks and notes the percent of change each Benchmark recorded between 1990 and 2000. Table 2 also indicates the category in which the Benchmark was placed (EC-Economy, C-Community, EN-Environment). In response

to criteria three for selection of the Benchmarks (see Table 1), the fourth column in Table 2 indicates which Benchmarks provide coverage for multiple categories.

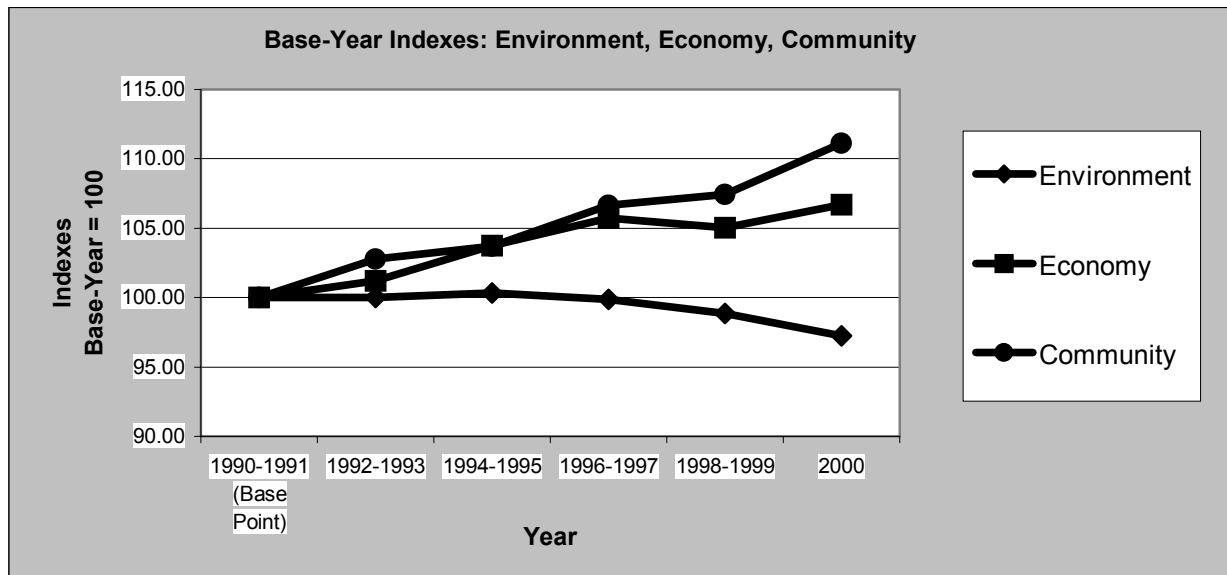
Table 2: Sustainability Benchmarks

Sustainability Benchmarks	Percent Change 1990-2000	Index	Benchmark Coverage
Income Disparity	-34.03%	EC	EC, C
Poverty	3.00%	EC	EC, C
Per Capita Income	1.50%	EC	EC
Economic Diversification	1.00%	EC	EC, C
College Completion	5.90%	EC	EC, C
High School Dropout Rate	-0.50%	EC	EC, C
Living Wage	4.50%	EC	EC, C
Affordable Housing	-6.00%	EC	EC, C
Employment Dispersion	-0.75%	EC	EC, C
Research and Development	26.60%	EC	E
Eighth Grade Skill Levels	9.00%	EC	EC, C
Timber Harvest	20.00%	EC	EC, C, EN
New Companies	-16.76%	EC	E
Drinking Water	41.00%	EC	EC, C, EN
Homelessness	8.70%	C	EC, C
Juvenile Arrests	-1.36%	C	EC, C
Volunteerism	-5.40%	C	EC, C
VMT	-4.29%	C	EC, C, EN
Commuting	-1.80%	C	EC, C, EN
Health Insurance Coverage	6.00%	C	EC, C
Overall Crime	3.49%	C	EC, C
Teen Pregnancy	32.32%	C	C
Child Abuse or Neglect	42.75%	C	EC, C
Teen Alcohol Abuse	3.40%	C	EC, C
Air Quality	0.35%	EN	EC, EN
Municipal Waste Disposal	-9.04%	EN	EC, C, EN
Agricultural Land	-1.74%	EN	EC, EN
Forest Land	1.0%	EN	EC, C, EN
Nuisance Species	-10.6%	EN	EN
Marine Species at Risk	-3.7%	EN	EN
State Park Acreage	-8.6%	EN	EC, C, EN
Stream Water Quality	14.00%	EN	EC, EN
Native Fish and Wildlife	-4.00%	EN	EN
Native Plant Species	1.00%	EN	EN
CO2 Emissions	-5.00%	EN	EN

Chart 1 displays the three indices. The data used for the indices is combined into biennial increments (1990-1991, 1992-1993, etc.). The performance of each index is depicted relative to a base-point value of 100. On each chart, upward movement of the lines represents movement *toward* sustainability; downward movement represents movement *away* from sustainability. The Environment Index rose slightly between 1992 and 1995, then decreased by almost three points between 1996 and 2000. Both the Economy and Community Indices showed significant

improvement over the decade. The Economy Index rose by almost seven points, and the Community Index rose by eleven points.

Chart1: Base Year Indices



Economy Index Performance

The Economy Index includes 14 Benchmarks. Five Benchmarks recorded significant improvement in sustainability over the time period: Drinking Water, Research and Development, Living Wage, College Completion and Eighth Grade Skill Levels.¹ Three Benchmarks showed decreasing sustainability: Income Disparity, Affordable Housing and Timber Harvest.

Environment Index Performance

The Environment Index includes 11 Benchmarks. One Benchmark recorded a significant increase: Stream Water Quality. Five Benchmarks exhibited significant decreases in sustainability: State Park Acreage, Municipal Waste, Native Fish and Wildlife, Marine Species and Carbon Dioxide Emissions.

Community Index Performance

The Community Index includes 10 Benchmarks. Four Benchmarks recorded a significant increase in sustainability: Child Abuse or Neglect, Teen Pregnancy, Homelessness, and Health Insurance Coverage. Two Benchmarks recorded significant decreases in sustainability: Vehicle Miles Traveled and Volunteerism.

“B” list Benchmarks

The Benchmarks in Table 2 - Group One, are not included in the current set of sustainability Benchmarks, but could be added when additional data becomes available for these Benchmarks. The Benchmarks in Group Two did not meet the criteria for inclusion, but might be considered useful for assessing sustainability after further analysis.

Table 3: “B” List Benchmarks

Group One	<i>Hunger</i>
	<i>Ready to Learn</i>
	<i>Wild and Native Fish Populations</i>
	<i>Adult Literacy</i>
	<i>Wetlands</i>
Group Two	<i>In-stream Water Rights</i>
	<i>Hazardous Waste Sites Clean-up</i>
	<i>Unemployment Rate</i>
	<i>Associates Degree</i>
	<i>Voting</i>
	<i>Available Child Care</i>
	<i>Infant Mortality</i>
<i>Third Grade Skill Levels</i>	

¹ “Significant” refers to Benchmarks with a change greater than 4% between 1990 and 2000.

Issues to Consider

Weighting: Consider assigning relative weights to the Benchmarks in each index. Relative weights could be established through a combination of expert input and public involvement. Weighting could place emphasis on specific Benchmarks that are identified as leading indicators of sustainability.

New Measures: Adopt new measures to improve the ability of the Benchmarks to measure statewide sustainability. The review of the sustainability indicator programs and responses to the expert questionnaire identified a number of data measurements that could be used to produce new Benchmarks. The majority of potential new measures are in the Benchmark categories of Economy, Community Development and Environment. Table 4 lists areas to consider for new measures by Benchmark category. Most of these areas do not overlap with current Developmental Benchmarks. Please see Appendix for additional details on each of these areas.

Table 4: New Measure Categories

Economy	Social Support
<i>Sustainable Economic Performance</i>	<i>Measures of Disease</i>
<i>Sustainable Industry</i>	Community Development
<i>Efficiency of Resource Use</i>	<i>Sustainable Residential Development</i>
<i>Economic Equity</i>	<i>Neighborhood Revitalization</i>
Education	<i>Planning for Sustainability</i>
<i>Sustainability as Curriculum</i>	<i>Sustainable Building</i>
<i>Sustainable School Funding</i>	Environment
<i>School Quality</i>	<i>Rates of Resource Use</i>
<i>Equity in Educational Performance</i>	<i>Rates of Reuse and Recycling</i>
Civic Engagement	<i>Environmental Justice</i>
<i>Diversity of Elected Representatives</i>	<i>Use of Toxic Materials</i>
<i>Local Government</i>	<i>Spending on Environmental Health</i>
<i>Civic Participation</i>	<i>Research and Development on Sustainability</i>

New Sustainability Definition: Consider a different definition for guiding sustainable development in Oregon. The language in the State definition of sustainability could be expanded to explicitly cover social sustainability. The current definition includes a strong focus on economic viability and sustainable resource use, but does not cover ideas such as strengthening social capital and equity issues.

New Sustainability Framework: Consider the option of creating a sustainability framework based on a new organizing principle. The three-domain index that is modeled in this research is not likely to provide a detailed enough understanding of inputs and outcomes to yield insights to support specific policy interventions to promote statewide sustainability. An adaptation of the three-domain framework could include elements of a pressure-state-response framework. The adaptation framework could include ‘suites’ of indicators within each of the three domains. The ‘suites’ would be made up of a set of issue-specific indicators that provide information about the pressures affecting an issue, the current state of the issue, and a gauge of the response to the issue. As an example, the current Stream Water Quality Benchmark could be considered a ‘state’ measure for water quality. The Benchmark could be paired with a land use measure to gauge ‘pressure’ on water quality, and a measure of financial resources allocated to the enforcement of water quality regulations as a gauge of ‘response’ to the issue. This adaptation has several drawbacks, namely the difficulty of effectively combining pressure, state and response measures to derive an accurate picture of a policy issue. Another concern is the need to focus on smaller geographic scales to accurately assess the condition of the policy issue. A suite of indicators for stream water quality may work on the scale of a small watershed, but would not

provide and accurate picture at the scale of the State, or even at the scale of the Willamette Watershed.

Mapping the Measures: To the extent possible, mapping the data using a Geographic Information System (GIS) would provide additional spatial insights into static and longitudinal trends. Understanding how different sections of Oregon move forward on reaching sustainability goals can help direct policy and program intervention to areas most in need of assistance.

Index Use: Evaluate your goals and consider whether or not an index is appropriate for getting you there – Indices are not very useful for tackling specific issues, but can be very useful for mobilizing interest and support around a set of issues.

Appendices

Index Breakdown Charts:

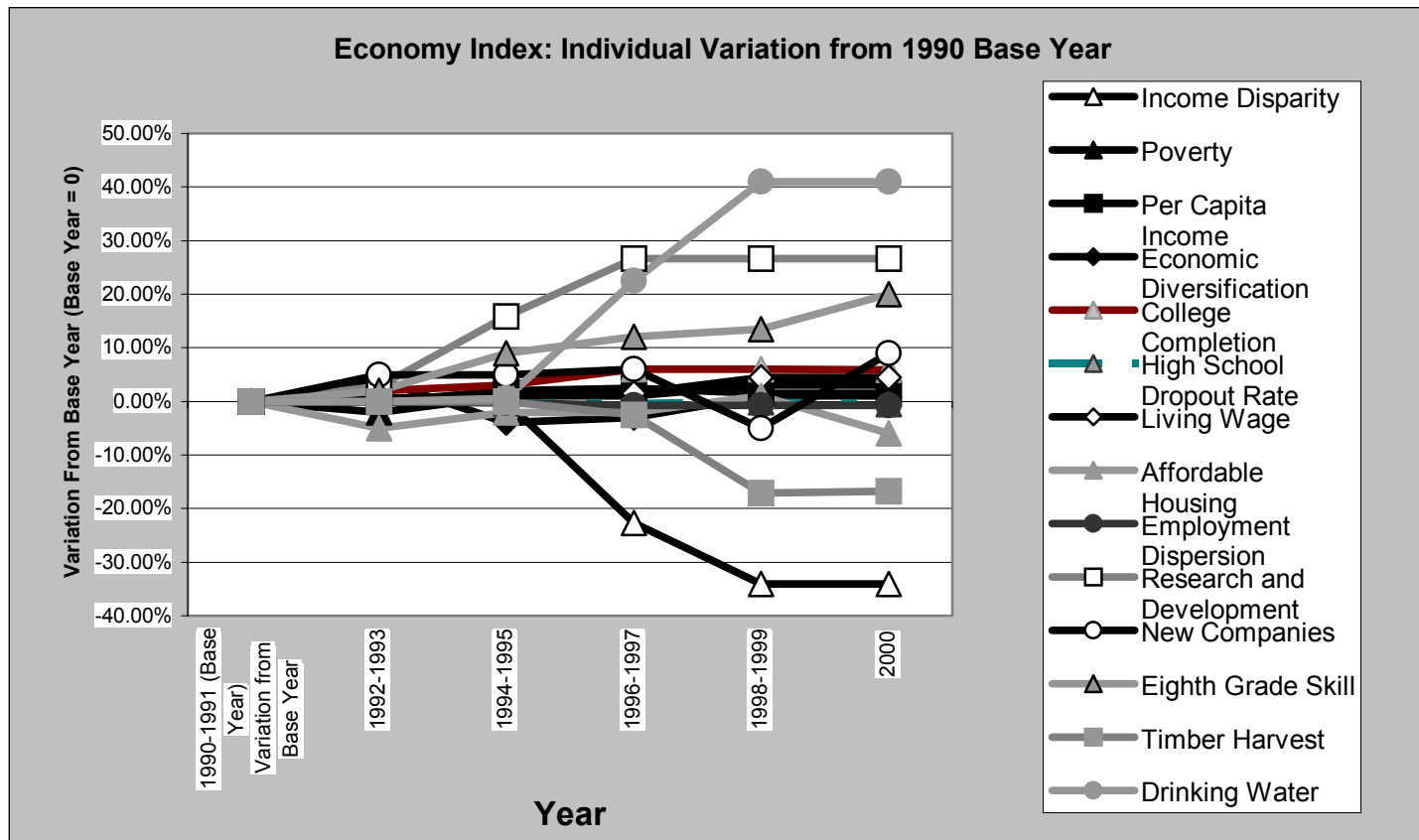
A)-C) Economy, Community, Environment

D) Indices Relative to Target

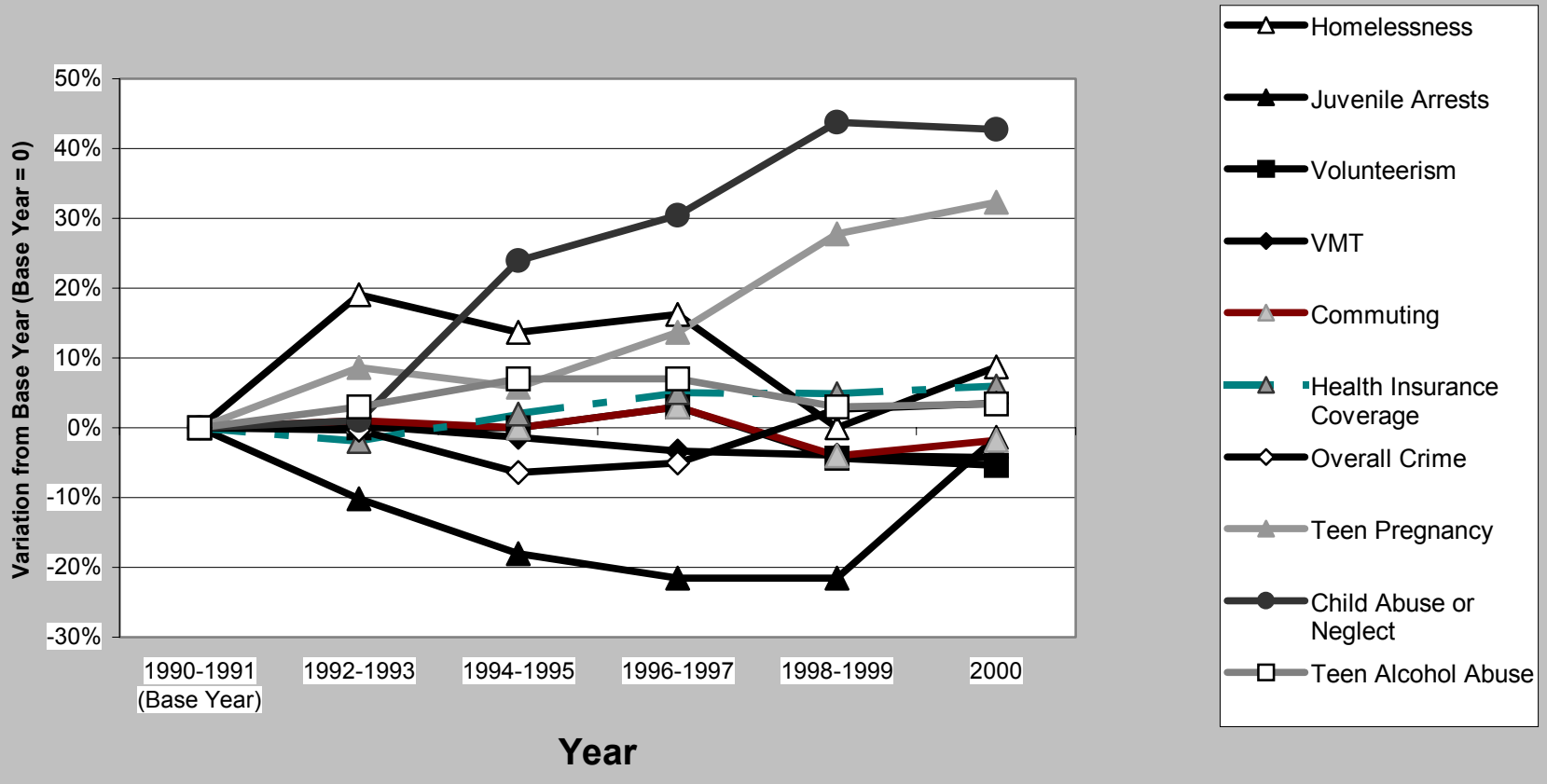
E) Sustainability Benchmarks compared to Key Benchmarks

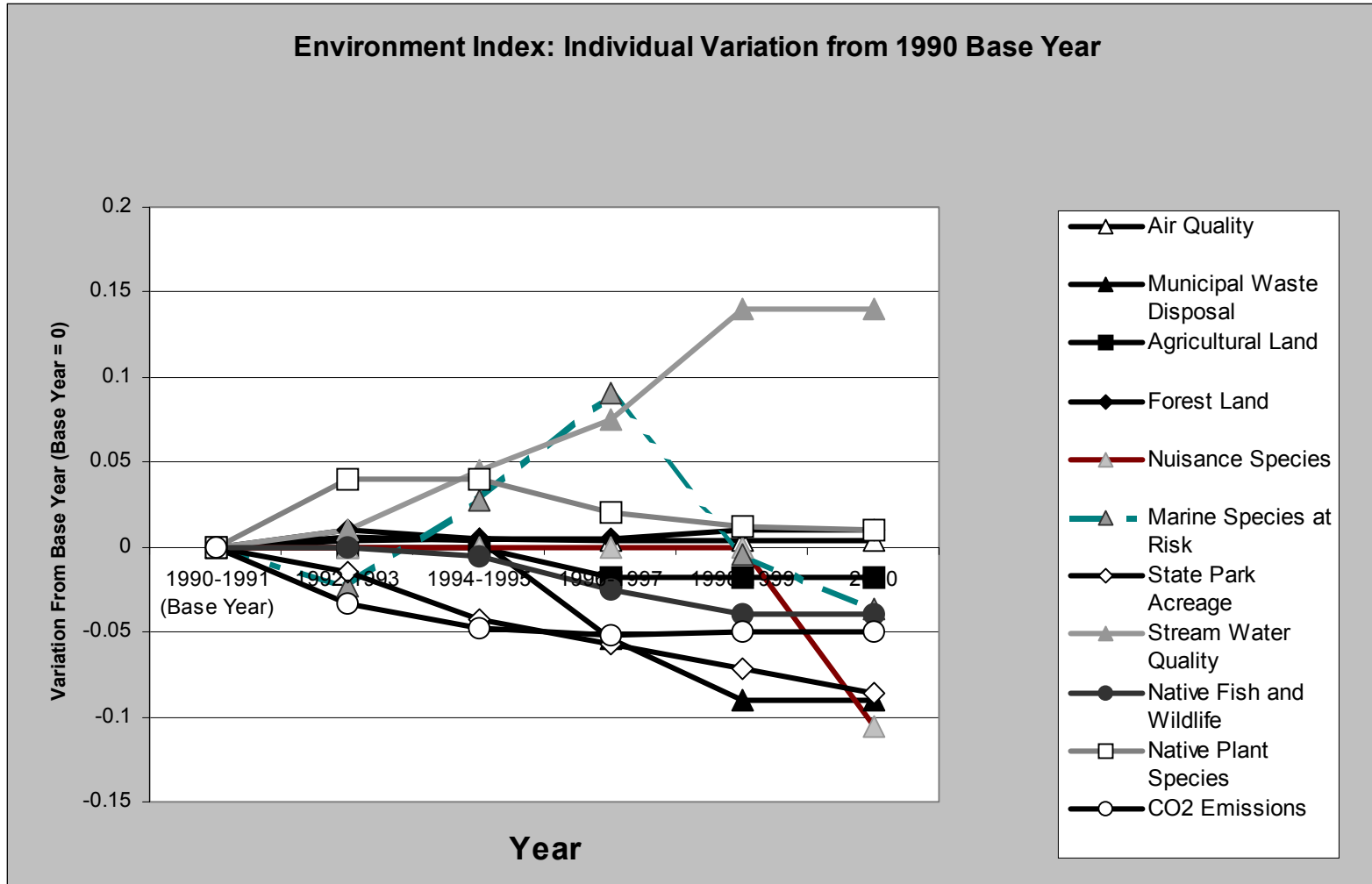
F) - H) Data Conversion Notes

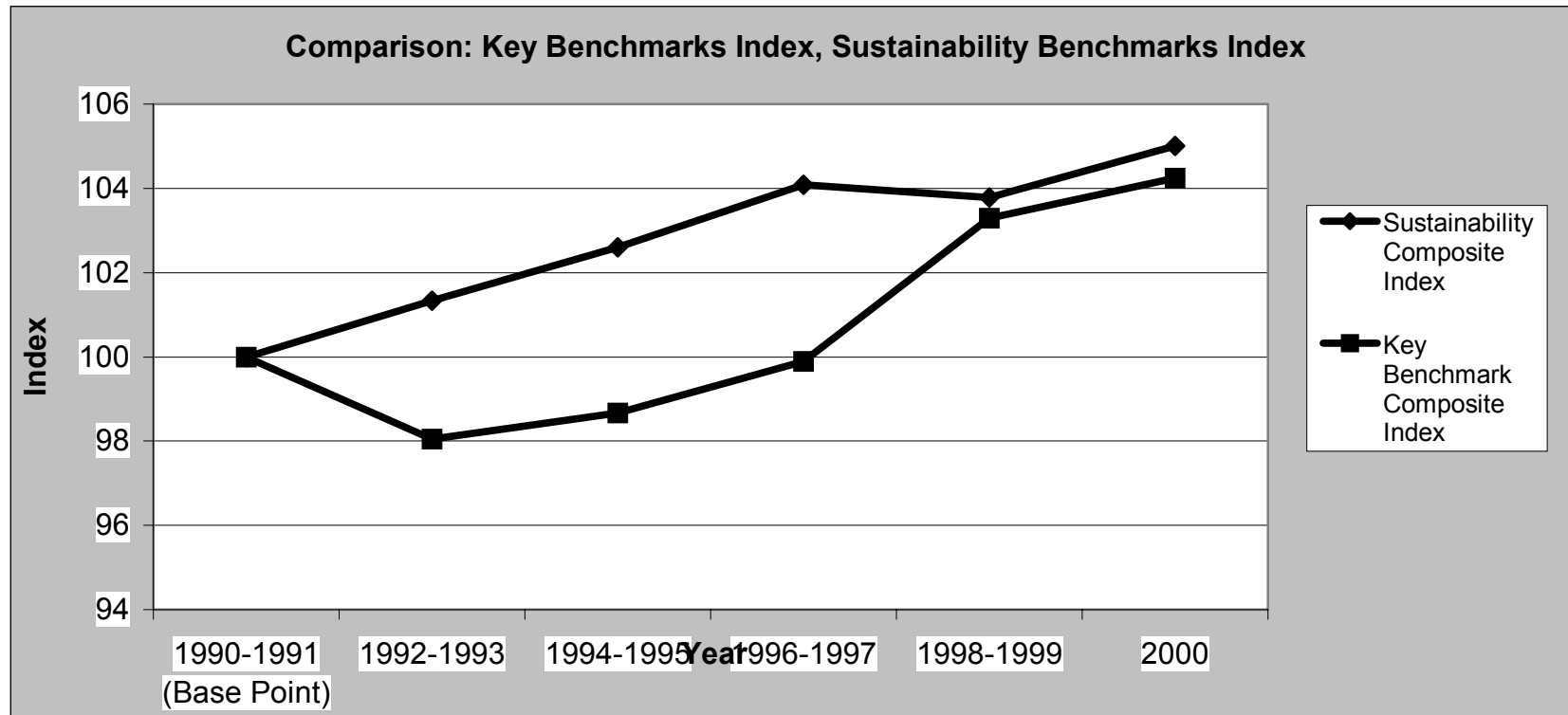
I) - J) New Measures Summary Table



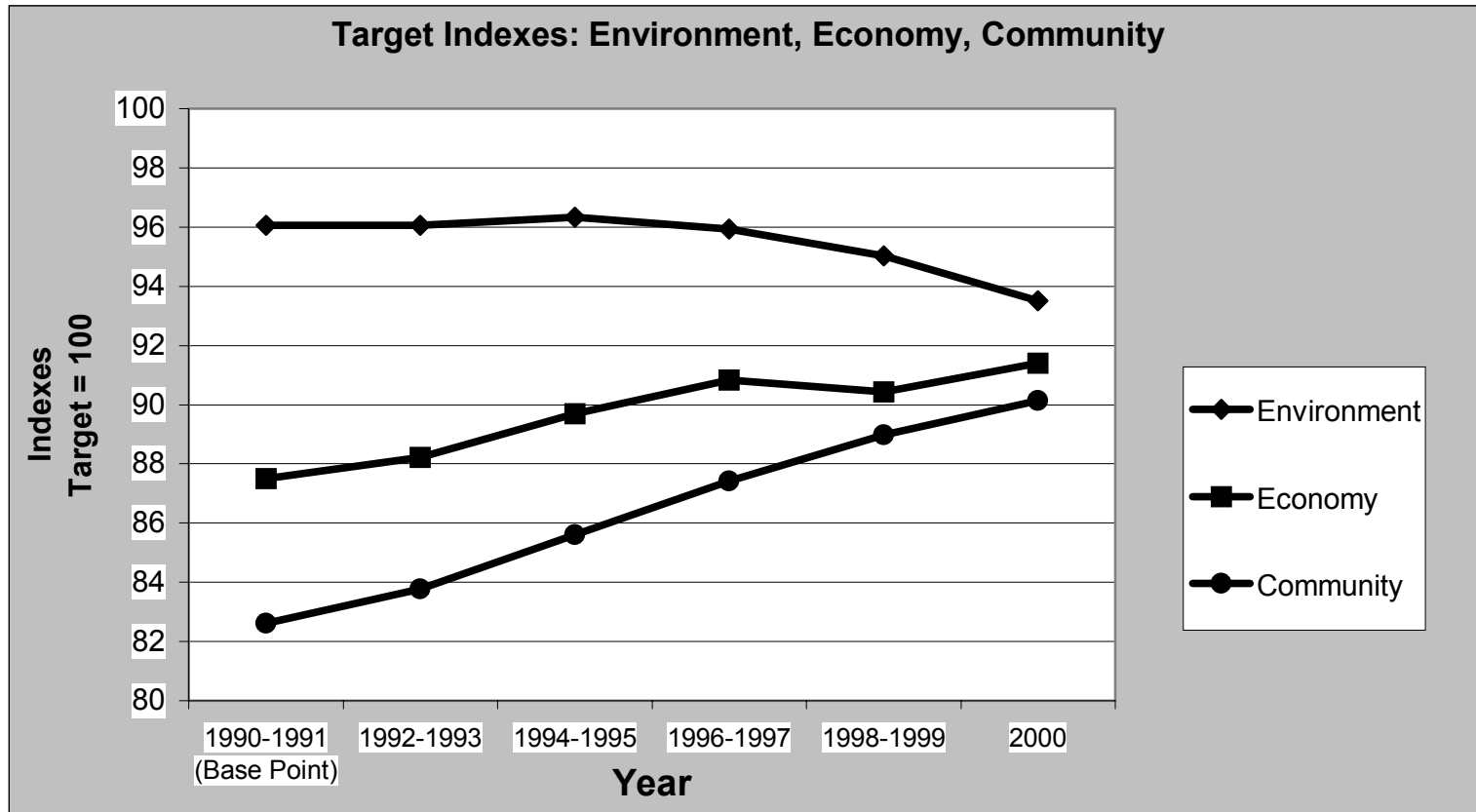
Community Index: Individual Variation from 1990 Base Year







This chart displays a comparison between the Sustainability Index and an index of the 25 Key Benchmarks. Each index covers the years 1990-2000. The increase in the Sustainability Index, in both absolute terms and relative to the Key Benchmark Index, may indicate that Oregon's increasing emphasis on sustainability is generating positive statewide results.



This chart depicts the performance of each index relative to the aggregated Targets for the Benchmarks in each Index. Notice that although the directions of the sustainability trends are similar to the trends in Chart 1 (declining sustainability for Environment, but improving sustainability for Economy and Community), the base-points are different, indicating the different levels of performance relative to the Targets.

Sustainable Economy: Data Conversion Notes
Income Disparity: Ratio of top 5th families incomes to lowest 5th families incomes. Conversion Notes: percentage of 1980 ratio, inverted, 90 data used as proxy for 92-93 data-point, 94-95, 96 and 98 data used for remaining points.
Poverty: Percentage of Oregonians with incomes below 100% federal poverty level, modified 2001 data. Conversion Notes: actual percentage, inverted, 90-91 averaged per biennium, all other points are based on single data points, 99 used as proxy for 00.
Per Capita Income: Per capita personal income as a percentage of the U.S. per capita income. Conversion Notes: actual percentage, all points average per biennium, 99 point used as proxy for 00.
Economic Diversification: Oregon's national rank in economic diversification. Conversion Notes: inverted percentage, all points averaged per biennium, 99 point used as proxy for 00.
College Completion: Percentage of Oregon adults who have completed a bachelor's degree. Conversion Notes: actual percentage, data points available for 90, 92, 94, 96, 98, 00.
High School Dropout Rate: Percentage of students (annually) who leave grades 9-12 before graduating. Conversion Notes: actual percentage, inverted, all points averaged per biennium, 99 used as proxy for 00.
Living Wage: Workers at 150% or more of poverty level. Conversion Notes: actual percentage, all points averaged per biennium, 99 used as proxy for 00.
Affordable Housing: Percentage of low-income households (renters) spending more than 30% of household income on housing. Conversion Notes: actual percentage, inverted, data points available for 90, 92, 96, 98, 00, 96 data used as proxy for 94-95 data-point.
Employment Dispersion: Percentage of Oregonians employed outside the Willamette Valley and the Portland Tri-County Area. Conversion Notes: actual percentage, all points averaged per biennium, 99 used as proxy for 00.
Research and Development: (old benchmark) Industry research and development expenditures as a percentage of gross state product. Conversion Notes: Oregon's expenditures on R and D as a percentage of gross state product as a percentage national expenditures on R and D as a percentage of gross national product, data available for 90, 91, 93, 95 and 97, 97 data used as proxy for 98-99 and 00), the 2005 target is the ratio of the 2005 target (1.2%) to the 1997 national figure (1.8%).
New Companies: Oregon's national rank in new companies. Conversion Notes: inverted percentage, all points average per biennium, 99 point used as proxy for 00.
Eighth Grade Skill Levels: Percentage of 8th graders who achieve established skill levels. Conversion Notes: actual percentage, averaged reading and math scores, data available for 91, 93, 95, 96, 97, 98, 99, 00, data points average per biennium for 96-97, 98-99.
Timber Harvest: Actual harvest levels as a percentage of sustainable harvest levels. Conversion Notes: averaged percentage of public lands and private lands, 95 data used as proxy for all earlier data points, data points available for 95, 96, 97, 98, 99, 99 data used as proxy for 00. (A sample 2005 target of 100% was assigned).
Drinking Water: Percentage of Oregonians served by public drinking water systems that meet health based standards. Conversion Notes: actual percentage, 95 used as proxy for 90-91, 92-93, 94-95, 96-97, 98-99 averaged per biennium, 99 used as proxy for 00.

Sustainable Community: Data Conversion Notes
Homelessness: Number of Oregonians that are homeless on any given night (per 10,000). Conversion Notes: percentage of 92 data point, 92 data point =100%, inverted, data available for 92-00, all data points averaged per biennium, 92 data used as proxy for 90-91 data point.
Juvenile Arrests: Total juvenile arrests per 1,000 juvenile Oregonians per year. Conversion Notes: Percentage of 1980 data point, inverted, data available for all years 90-99, 99 data used as proxy for 00, all data points averaged per biennium.
Volunteerism: Percentage of Oregonians who volunteer at least 50 hours of their time per year to civic, community or, nonprofit activities. Conversion Notes: actual percentage, inverted, data available for 92, 96, 98, 00, 92 used as proxy for 90-91, 94-95.
Vehicle Miles Traveled: Vehicle miles traveled per capita in Oregon metropolitan areas (per year). Conversion Notes: Percentage of 1980 data point, inverted, data available for all years 90-99, 99 data used as proxy for 00, all data points averaged per biennium.
Commuting: Percentage of Oregonians who commute during peak hours by means other than single occupancy vehicle. Conversion Notes: actual percentage, data points available for 90, 92, 94, 96, 98, and 00.
Health Insurance Coverage: Percentage of Oregonians without health insurance. Conversion Notes: actual percentage, inverted, only single data points available per biennium.
Overall Crime: Overall reported crimes per 1,000 Oregonians. Conversion Notes: all crimes, percentage of 90-91 base-point, 90-91 = 100%, all points averaged per biennium, 99 used as proxy for 00.
Teen Pregnancy: Pregnancy rate per 1,000 females age 15-17. Conversion Notes: percentage of 90-91 base-point, 90-91 = 100%, all points averaged per biennium, 99 used as proxy for 00.
Child Abuse or Neglect: Number of children, per 1,000 persons under 18, who are neglected/abused. Conversion Notes: Percentage of 90-91 base-point, 90-91 = 100%, all points averaged per biennium, 99 used as proxy for 00.
Teen Alcohol Abuse: Percentage of 8th grade students who report using alcohol in the previous month. Conversion Notes: actual percentage, data available for 90, 92, 94, 96, 98, 00.

Sustainable Environment: Data Conversion Notes
Air Quality: Percent of time that the air is healthy to breathe for all Oregonians. Conversion notes: actual percentage, all points averaged per biennium.
Municipal Waste Disposal: Pounds of municipal solid waste landfilled or incinerated per capita. Conversion notes: percentage of 1992 pounds per capita, all points averaged per biennium, 92 data used as proxy for 90-91, 98-99 data-point used as proxy for 00.
Agricultural Lands: Percentage of all Oregon agricultural land in 1982 still preserved for agricultural use. Conversion notes: actual percentage, 92 data used as proxy for 90-91, 92-93, 94-95, 97 data used as proxy for 96-97, 98-99 and 00 (A sample 2005 Target of 100% was assigned).
Forest Lands: Percentage of Oregon forest land in 1970 still preserved for forest use. Conversion notes: actual percentage, all data points averaged per biennium, 99 data used as proxy for 00 (A sample 2005 Target of 100% was assigned).
Nuisance Species: Number of nuisance invasive species established in Oregon. Conversion notes: percentage of 90, inverted, 90 data used as proxy for all data points except 00 (A sample 2005 Target was set at the 1990 level).
Marine Species at Risk: Percentage of assessed marine species at risk. Conversion notes: actual percentage, inverted, all data points average per biennium (A sample 2005 Target equal to the 1980 data point (9.1%) was assigned).
State Park Acreage: Acres of state-owned parks per 1,000 Oregonians. Conversion notes: percentage of 1980 data, all data points averaged per biennium.
Stream Water Quality: (new benchmark), percentage of stream sites with water quality in good to excellent condition. Conversion notes: actual percentage, 90-91 data point based on 90 data, no data available 92-93, 1994 figure used as proxy for 92-93, 94-95, 96-97 points averaged per biennium, 99 data point used as proxy for 00.
Native Fish and Wildlife: (old benchmark) Percentage of native fish and wildlife species that are healthy. Conversion notes: actual percentage, all points averaged per biennium except 90-91, 99 data used as a proxy for 00.
Native Plant Species: Percentage of native plant species that are healthy. Conversion notes: actual percentage, all points averaged per biennium except 90-91, 99 point used as a proxy for 00 (2000 Target used for "relative to target").
CO2 Emissions: CO2 emissions in the state relative to 1990 emissions. Conversion notes: actual percentage, inverted, all points averaged per biennium except 90-91, 96-97 point used as proxy for 98-99 and 00 points.

Economy
Sustainable Economic Performance: measures that consider sustainability principles when evaluating economic performance (e.g. adjusted gross state product: minus social and environmental costs and externalities, dollar value of locally produced goods and services purchased in the region annually)
Sustainable Industry: measures that gauge the adoption of sustainability practices by industry, government and local communities (e.g. Industry Type: Industrial activity focused on resource extraction compared to industrial activity focused on resource reuse as compared to total industrial production)
Efficiency of Resource Use: measures that address energy and natural resource stocks and flows (e.g. percent of energy supply from domestic (state) sources, and renewable energy use as a percentage of total energy use)
Economic Equity: employment and income measures that address equity issues across gender, race and location (e.g. median hourly wages by gender and race)
Education
Sustainability as Curriculum: measures of the integration of sustainability issues into educational curriculum (e.g. percentage of schools with curriculum designed to teach children and adults about the implementation of sustainability practices)
Sustainable School Funding: measures of availability and types of investment in education (e.g. total dollars spent per public school pupil from all sources)
School Quality: measures related to school quality (e.g. student teacher ratio)
Equity in Educational Performance: measures of educational performance of different demographic groups (by race, ethnicity and gender)
Civic Engagement
Diversity of Elected Representatives: measures of the representation of different demographic groups in elected bodies (by race, ethnicity, gender)
Local Government: amount of tax revenue shared among local governments, tracked annually
Civic Participation: measures of participation in community events

Social Support
Measures of Disease: measures of additional medical problems (e.g. heart disease, cancer, asthma, suicide) by race, ethnicity, gender
Community Development
Sustainable Residential Development: Average density of new housing units and percent of total housing within 1/2 mile of transit nodes
Neighborhood Revitalization: measures of investment in urban and low-income neighborhoods
Planning for Sustainability: number of jurisdictions that incorporate sustainability goals and principles into comprehensive plans
Sustainable Building: measure the percentage of new and remodeled buildings that use sustainable building materials and design (e.g. percent of new and existing buildings certified by sustainable building standards)
Environment
Rates of Resource Use: measures of per capita use of key resources (energy, water)
Rates of Reuse and Recycling: measures of both lbs. of recycled waste per capita and lbs. of waste reused locally for new products
Environmental Justice: measures of disproportionate environmental impacts on low-income and minority neighborhoods (e.g. amount of particulate (air) matter per capita in targeted low-income neighborhoods)
Use of Toxic Materials: measures of the production and use of man-made, toxic, non-biodegradable materials in Oregon
Spending on Environmental Health: measures tracking expenditures on environmental conservation, restoration and regulation.
Research and Development on Sustainability: measures of the amount spent statewide on R and D for environmentally friendly technology.