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GLOSSARY

Annualized Benefits and Costs. The value of benefits and costs based on the probability the benefit or cost will be realized in a given year.

Alternative Valuation Methods. Techniques devised by economists to measure the monetary value of non marketed goods.

Assets. Lives, buildings, utilities and transportation systems, cultural, social.

Benefit. Any increase in utility or well-being to an individual, group, or society associated with an action or choice. The price of a good sold in a competitive market represents a lower bound on its benefit. Benefit is synonymous with value in economic theory. Benefits and costs are complementary; a cost is a negative benefit, since costs decrease well-being and benefits increase well-being. This is the source of much confusion in benefit-cost analysis, since different accounting methods will assign the same impact as a benefit or a cost. It is also the source of double counting and should be avoided. Benefits and costs should be identified separately because they are separated by individuals over space and over time. (From Ganderton, 2004)

Benefit-Cost Analysis. A systematic quantitative method of assessing the desirability of government projects or policies when it is important to take a long view of future effects and a broad view of possible side-effects. Benefit-cost analysis is recommended as the technique to use in a formal economic analysis of government programs or projects. (From OMB A-94).

Casualty. A death or nonfatal injury.

Cost. Any reduction in utility or well-being to an individual, group or society associated with an action or choice. Generally it is not the same as price, which bounds cost from above (from Ganderton, 2004).

Comprehensiveness Factor. Indicates the additional benefits relative to the original FEMA costs that may be estimated given spin-off activities and effects. In effect, if $C is spent in the aggregate by FEMA and by local cost-sharing, then in the aggregate $F is expected as a spin-off effect. This $F does not overlap with any specific benefits associated with the grant itself (e.g., risk reductions that take place in accordance with the grant itself, and these include spillover effects), other than spin-off benefits. That is, this $F does not duplicate any other benefits estimated. Thus, other benefits as calculated elsewhere may be ignored in the estimation of this comprehensiveness factor.

Cost Effective. The least cost alternative means for achieving the same stream of benefits or a given objective. Cost-effectiveness analysis is less comprehensive than benefit-cost analysis, but can be appropriate when the benefits from competing alternatives are the same or where a policy decision has been made that the benefits must be provided. It can be used to compare programs with identical costs but differing benefits. FEMA guidance has defined cost-effective as the benefits equal to or exceeding the costs. (From OMB A-94)

Damage. Damage refers to physical destruction measured by physical indicators such as the number of deaths and injuries or the portions of buildings destroyed, or altered so that repair is needed. When valued in monetary terms, damages become direct losses (from Litan, 1999).

Discount Rate. Discount rate is the interest rate used in calculating the present value of expected yearly benefits and costs. Net present value represents the discounted value of future benefits and costs. Discounting reflects the time value of money and the view that costs and benefits (other than the economic value of avoiding future statistical deaths and nonfatal injuries) are worth more when they are experienced sooner. OMB determines the discount rate for analysis of federally funded projects.

Empirical. Relying on experience or observation, capable of being verified or disproved by observation or experiment.

Expected Value. The probability weighted outcome of an activity.

Exposure. People, property, systems, or functions at risk of loss exposed to hazards.

Hazard. An act or phenomenon that has the potential to produce harm or other undesirable consequences to some person or thing.

Hazard load. The specific hazard level (e.g., peak ground acceleration for earthquake) applied to a facility in the assessment of structural performance.

Impacts. The impacts of a disaster include market-based and non market-based effects. Market-based impacts include destruction of property and a reduction in income and sales (Litan, 1999). Nonmarket effects include environmental consequences and psychological effects suffered by persons involved in a disaster (from Ganderton, 2004)

Injury. Damage or harm caused to the structure or function of the body caused by an outside agent or force, which may be physical or chemical. Synonymous with casualty, this term includes both nonfatal and fatal injuries.

Loss. Any reduction in value, or well-being to individuals, groups or society. A loss is a cost. Losses avoided are benefits.

> **Direct Losses**. Losses linked directly to a hazard event including all property damages and business interruption losses due directly to the closure of damaged facilities.
>
> **Indirect Losses**. All losses other than direct losses. Indirect losses include economic losses due to dislocations in undamaged factories or commercial ventures, banking, and insurance as well as non financial losses such as loss of historical resources, pain, and suffering.

Market Price. The price for which a good is bought and sold in a market. If restrictive conditions are satisfied, this price may be used to estimate the economic value of the good. Or, the market price may need to be corrected, a 'shadow price' derived, in order for the economic value of the good to be estimated (from Handmer, 1996).

Maximum Foreseeable Loss. An estimate of losses assuming the worst combination damage and disruption to a business. This estimate allows consideration of the worst possible consequences.

Mitigation. All actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. Mitigation activities contrast with short-term risk-reducing actions such as preparedness, response and recovery measures and risk spreading measures such as insurance.

Multiplier. The ratio between the direct effect on output or employment (in the denominator) and the full effect including the effects of second-order rounds of spending (in the numerator). (From OMB A-94)

Net Present Value. The discounted monetized value of expected net benefits (i.e., benefits minus costs). This is the standard criterion for deciding whether a government program can be justified on economic principles. Net present value is computed by assigning monetary values to costs and benefits, discounting future costs and benefits (other than the economic value of avoiding future statistical deaths and nonfatal injuries, which is not discounted) using an appropriate discount rate, and subtracting the sum total of discounted costs from the sum total of discounted benefits. (From OMB A-94)

Non-exceedance probabilities. A term used to quantify the likelihood or probability that a particular level of hazard or risk will not be exceeded in some time period.

Nonstructural. All elements of a building that are not expected to carry any of the external (earthquake) or internal (weight) loads of a building. These general include utility systems, elevators, light fixtures, internal partitions, etc.

Opportunity Cost. The value of alternatives foregone to achieve an economic activity. It can be thought of as the value of the good or service in its best alternative use. For example, the value of a park in its next highest alternative use as an industrial area (from Handmer, 1996).

Present Value. The value of a stream of benefits or costs when discounted back to the present time (from Handmer, 1996).

Probabilistic. Refers to the fact that an outcome will not take place with certainty but that there is a (probability) distribution of potential outcomes.

Probability distribution. A function that identifies the probability of being less than or equal to a particular parameter or value. Opposite of non-exceedance probability.

Process Mitigation. Indirect mitigation activities that lead to policies, practices and projects that reduce risk. They include efforts to assess hazards, vulnerability and risk; conduct planning to identify projects, policies and practices and set priorities; educate decision-makers and build constituencies and political will; and to facilitate the selection, design, funding and construction of projects.

Project Mitigation. Project mitigation includes measures to avoid or reduce damage resulting from hazard events. They include projects to elevate, acquire and/or relocate buildings, lifelines and structures threatened by floods, strengthen buildings to resist earthquake or wind forces, and to improve drainage and land conditions.

Pushover curve. A graphical depiction relating the approximate seismic force applied to a building and the degree to which it deforms.

Q3. Flood map data available from FEMA (http://www.fema.gov/fima/nfip.shtm). These data indicate where frequent flooding areas occur throughout the U.S.

Resilience. The ability of an individual, household, business, or community to cushion itself from losses (static definition). The ability of a unit to return to a desired state and the speed at which this is attained (dynamic definition).

Response spectrum. A set of curves that maps out the response of a structure (at different damping values) as a function of frequency or period.

Risk. The probability that the potential harm or undesirable consequences of a hazard will be realized; the convolution of the hazard, vulnerability (or fragility), and asset exposure.

Saving. Formally saving is the reduction in present consumption to increase future consumption. It defers benefits from the present to the future, and consequently allows temporal shifting of benefits. However, in some contexts, the word is used to mean losses avoided, so implying a benefit (from Ganderton, 2004).

Shadow Prices. If a market for a good is not perfectly competitive, then market prices will not reflect the opportunity costs of that good. The price of the good, as corrected to equal its opportunity cost, is termed its shadow price (from Handmer, 1996).

Statistical death. The death of an unknown person at an unknown future date.

Statistical injury. The death or nonfatal injury of an unknown person at an unknown future date.

Structural. The load-bearing part of a building. This would include the framing system, the roof and diaphragm system, and any internal elements designed to carry lateral or vertical loads.

Synergistic Activities. Synergistic activities are activities or effects that follow or accompany the award of FEMA grants for project mitigation or process mitigation activities or the strong expectation that a grant would be awarded, that reduce risks (or increase benefits of risk-reduction activities) from floods, earthquakes, and severe winds. These activities are not funded by FEMA.

Unscented transform. A mathematical technique for selecting samples of set of uncertain variables, to estimate the mean value, variance, and other statistics of a function of those variables. The technique is far more efficient than random sampling (such as by Monte Carlo simulation), meaning that far fewer samples are required using the unscented transform than using random sampling to achieve the same level of accuracy.

Vulnerability. The susceptibility to physical injury, harm, damage, or economic loss.