

Appendix H

Ecological, Social, and Economic Considerations

Below are examples of the types of questions that might be used in roads analysis to assess benefits, problems, and risks. Benefits are the potential uses and socioeconomic gains provided by roads and related access. Problems are conditions for certain environmental, social, and economic attributes that managers deem to be unacceptable. Risks are likely future losses in environmental, social, and economic attributes if the road system remains unchanged. The questions below should be used as a checklist to scan the range of possible benefits, problems, and risks and to screen them for those relevant to roads in the area under consideration. Answering all of the questions will usually not be necessary. The relevant questions can then be used to guide more in-depth assessment and link to the science base for each of the identified benefits, problems, and risks.

After each question is a code [for example, AQ (1)] for cross-reference to Appendix 1 of *Roads Analysis: Informing decisions about managing the National Forest Transportation System*, which takes each example question and describes some scale considerations, information needs, analytical tools, and recommended references that might assist the interdisciplinary team.

These questions and associated information are not intended to be prescriptive, but they are here to assist interdisciplinary teams in developing questions and approaches appropriate to each analysis area. Which questions are appropriate for a particular analysis area and which warrant deep or cursory treatment will depend on the particular area and the issues being addressed. Some question may need to be addressed at several scales.

Addressing these and other road-related questions may benefit from the use of indicators: that is, maps, GIS queries, statistical summaries, or other information displays that contribute to understanding the benefits, needs, risks, and effects of roads. Even the best indicators will not answer questions directly but may assist in discerning and quantifying important interactions. Appendix 2 provides some examples of indicators and risk assessment techniques that can be helpful in this step. Appendix 3 describes a package of software tools developed to facilitate the generation of indicators.

Ecosystem Functions and Processes (EF)

What ecological attributes, particularly those unique to the region, would be affected by roading of currently unroaded areas? EF (1)

To what degree do the presence, type, and location of roads increase the introduction and spread of exotic plant and animal species, insects, diseases, and parasites? What are the potential effects of such introductions to plant and animal species and ecosystem function in the area? EF (2)

To what degree do the presence, type, and location of roads contribute to the control of insects, diseases, and parasites? EF (3)

How does the road system affect ecological disturbance regimes in the area? EF (4)

What are the adverse effects of noise caused by developing, using, and maintaining roads? EF (5)

Aquatic, Riparian Zone and Water Quality (AQ)

Watershed and upper catchment processes

How and where does the road system modify the surface and subsurface hydrology of the area? AQ (1)

How and where does the road system generate surface erosion?
AQ(2)

How and where does the road system affect mass wasting? AQ (3)

How and where do road-stream crossings influence local stream channels and water quality? AQ (4)

How and where does the road system create potential for pollutants, such as chemical spills, oils, de-icing salts, or herbicides to enter surface waters? AQ (5)

How and where is the road system 'hydrologically connected' to the stream system? How do the connections affect water quality and quantity (such as delivery of sediments, thermal increases, elevated peak flows)? AQ (6)

Affected values and lower catchment processes and influences

What downstream beneficial uses of water exist in the area?

What changes in uses and demand are expected over time? How are they affected or put at risk by road-derived pollutants? AQ (7)

How and where does the road system affect wetlands? AQ (8)

How does the road system alter physical channel dynamics, including isolation of floodplains; constraints on channel migration; and the movement of large wood, fine organic matter, and sediment? AQ (9)

How and where does the road system restrict the migration and movement of aquatic organisms? What aquatic species are affected and to what extent? AQ (10)

How does the road system affect shading, litterfall, and riparian plant communities? AQ (11)

How and where does the road system contribute to fishing, poaching, or direct habitat loss for at-risk aquatic species? AQ (12)

How and where does the road system facilitate the introduction of non-native aquatic species? AQ (13)

To what extent does the road system overlap with areas of exceptionally high aquatic diversity or productivity, or areas containing rare or unique aquatic species or species of interest? AQ (14)

Terrestrial Wildlife (TW)

What are the direct effects of the road system on terrestrial species habitat? TW (1)

How does the road system facilitate human activities that affect habitat? TW (2)

How does the road system affect legal and illegal human activities (including trapping, hunting, poaching, harassment, road kill, or illegal kill levels)? What are the effects on wildlife species? TW (3)

How does the road system directly affect unique communities or special features in the area? TW (4)

Economics (EC)

How does the road system affect the agency's direct costs and revenues? What, if any, changes in the road system will increase net revenue to the agency by reducing cost, increasing revenue, or both? EC (1)

How does the road system affect priced and non-priced consequences included in economic efficiency analysis used to assess net benefits to society? EC (2)

How does the road system affect the distribution of benefits and costs among affected people? EC (3)

Commodity Production

Timber management (TM)

How does road spacing and location affect logging system feasibility? TM

(1) How does the road system affect managing the suitable timber base and

Other lands? TM (2)

How does the road system affect access to timber stands needing silvicultural treatment? TM (3)

Minerals management (MM)

How does the road system affect access to locatable, leasable, and salable minerals? MM (1)

Range management (RM)

How does the road system affect access to range allotments? RM (1)

Water production (WP)

How does the road system affect access, constructing, maintaining, monitoring, and operating water diversions, impoundments, and distribution canals or pipes? WP (1)

How does road development and use affect the water quality in municipal watersheds? WP (2)

How does the road system affect access to hydroelectric power generation? WP (3)

Special forest products (SP)

How does the road system affect access for collecting special forest products? SP (1)

Special-Use Permits (SU)

How does the road system affect managing special-use permit sites? (Concessionaires, communications sites, utility corridors, and so on)? SU (1)

General Public Transportation (GT)

How does the road system connect to public roads and provide primary access to communities? GT (1):

How does the road system connect large blocks of land in other ownership to public roads (ad hoc communities, subdivisions, inholdings, and so on)? GT (2)

How does the road system affect managing roads with shared ownership or with limited jurisdiction? (RS 2477, cost-share, prescriptive rights, FLPMA easements, FRTA easements, DOT easements)? GT (3)

How does the road system address the safety of road users? GT (4)

Administrative Uses (AU)

How does the road system affect access needed for research, inventory, and monitoring? AU (1)

How does the road system affect investigative or enforcement activities? AU (2)

Protection (PT)

How does the road system affect fuels management? PT (1)

How does the road system affect the capacity of the Forest Service and cooperators to suppress wildfires? PT (2)

How does the road system affect risk to firefighters and to public safety? PT (3)

How does the road system contribute to airborne dust emissions resulting in reduced visibility and human health concerns? PT (4)

Recreation

Unroaded recreation (UR)

Is there now or will there be in the future excess supply or excess demand for unroaded recreation opportunities? UR (1)

Is developing new roads into unroaded areas, decommissioning of existing roads, or changing the maintenance of existing roads causing substantial changes in the quantity, quality, or type of unroaded recreation opportunities? UR (2)

What are the effects of noise and other disturbances caused by developing, using, and maintaining roads on the quantity, quality, and type of unroaded recreation opportunities? UR (3)

Who participates in unroaded recreation in the areas affected by constructing, maintaining, and decommissioning roads? UR (4)

What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available? UR (5)

Road-related recreation (RR)

Is there now or will there be in the future excess supply or excess demand for roaded recreation opportunities? RR (1)

Is developing new roads into unroaded areas, decommissioning existing roads, or changing maintenance of existing roads causing significant changes in the quantity, quality, or type of roaded recreation opportunities? RR (2)

What are the adverse effects of noise and other disturbances caused by constructing, using, and maintaining roads on the quantity, quality, or type of roaded recreation opportunities? RR (3)

Who participates in roaded recreation in the areas affected by road constructing, maintaining, or decommissioning? RR (4)

What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available? RR (5)

Passive-Use Value (PV)

Do areas planned for road entry, closure, or decommissioning have unique physical or biological characteristics, such as unique natural features and threatened or endangered species? PV (1)

Do areas planned for road construction, closure, or decommissioning have unique cultural, traditional, symbolic, sacred, spiritual, or religious significance? PV (2)

What, if any, groups of people (ethnic groups, subcultures, and so on) hold cultural, symbolic, spiritual, sacred, traditional, or religious values for unroaded areas planned for road entry or road closure? PV (3)

Will road construction, closure, or decommissioning significantly affect passive-use value? PV (4)

Social Issues (SI)

What are people's perceived needs and values for roads? How does road management affect people's dependence on, need for, and desire for roads? SI (1)

What are people's perceived needs and values for access? How does road management affect people's dependence on, need for, and desire for access? SI (2)

How does the road system affect access to paleontological, archaeological, and historical sites? SI (3)

How does the road system affect cultural and traditional uses (such as plant gathering, and access to traditional and cultural sites) and American Indian treaty rights? SI (4)

How are roads that are historic sites affected by road management? SI (5)

How is community social and economic health affected by road management (for example, lifestyles, businesses, tourism industry, infrastructure maintenance)? SI (6)

What is the perceived social and economic dependency of a community on an unroaded area versus the value of that unroaded area for its intrinsic existence and symbolic values? SI (7)

How does road management affect wilderness attributes, including natural integrity, natural appearance, opportunities for solitude, and opportunities for primitive recreation? SI (8)

What are the traditional uses of animal and plant species within the area of analysis? SI (9)

How does road management affect people's sense of place? SI (10)

Civil Rights and Environmental Justice (CR)

How does the road system, or its management, affect certain groups of people (Minority, ethnic, cultural, racial, disabled, and low-income groups)? CR (1)