Sand Dune Restoration and Protection Project, Avalon, New Jersey. Avalon has combined regulations with acquisition, a sand dune restoration program, and public education in an award-winning beach protection program.

Photo by Jon Kusler

have developed and distributed brochures, manuals, and model ordinances.[38] States have also conducted floodplain management workshops for local governments, including information on floodproofing and administration of regulations.

One-to-one consultations have been particularly effective at the local level. For example, members of conservation commissions in Concord and Lincoln, Massachusetts, visited landowners to advise them of wetland and floodplain designations and to explain the rationale for the restrictions. Other communities have sent copies of floodplain maps to all property owners. Avalon, New Jersey, included a brochure on dune protection with tax bills sent to property owners throughout the community.

Other Techniques

Regulations have also been combined with other approaches such as flood control works, evacuation plans, and flood warning systems. These are discussed in the next chapter.

The Conservation Foundation and Florida Audubon Society conduct a floodplain management training session in St. Augustine, Florida, with funds from FEMA, in May 1979.

Photo by Jon Kusler.

CHAPTER II

Footnotes

1. The concept of "wise use" of the nation's floodplains, taking into account not only flooding but also other, broader values, is contained in the Water Resources Council's A Unified National Program for Flood Plain Management. This document calls for "continuing efforts that seek to reduce and keep flood losses at acceptable levels while recognizing, preserving, and restoring the floodplain's natural values through wise use of water and related land resources."

   Regulations of the National Flood Insurance Program, 41 Fed. Reg. 46,964 (1976), also provide that "in formulating community development goals and in adopting flood plain management regulations, each community shall consider at least the following factors--

   (1) Human safety;

   (2) Diversion of development to areas safe from flooding in light of the need to reduce flood damages and in light of the need to prevent environmentally incompatible flood plain use;. . . ."

2. Sheaffer and Roland, Inc. (1981) examined 23 communities to quantify the economic, social and environmental effects of regulating the 100-year floodplain. Effects of floodplain regulations were evaluated by projecting development for 1980 and 1990 under three scenarios: (1) no regulations, (2) moderate regulations similar to the current FIA regulations, and (3) stringent regulations forbidding new developments and substantial improvements to existing structures. Some of the results of the study may be summarized as follows:

   (1) Average annual flood losses were projected to increase sharply (29% by 1980, 71% by 1990) with no regulations. Under moderate regulations, losses would increase somewhat. Under stringent regulations losses would decline 1% by 1990.

   (2) With no regulations, the number of housing units in the floodplain would increase by 13% by 1980 and 35% by 1990; and population would increase in the 100-year floodplain 12% by 1980 and 29% by 1990. With moderate regulations, housing units would be increased somewhat by 1980 and 1990. With stringent regulations, housing units in the 100-year floodplain would decline 1% by 1980 and 6% by 1990.

3. Burby and French concluded that

   > Flood plain land use management regulations, including those required by the NFIP, have had little effect on the rate of flood plain invasion. . . . While staff and funding commitments may indicate that communities are taking steps to see that new construction is at least elevated or flood-proofed so that some protection against flood damage is provided, these data clearly show that local flood plain land use management is not halting the continued invasion of flood plains. Furthermore, fostering regulations that are focused on the design of

development, such as local regulations required for participation in the National Flood Insurance Program, does not necessarily lead communities to restrict floodplain use (1981, p. 294).

4. See discussion at pages 192-195.

5. 24 C.F.R. § 1910.3 (1976).

6. See, for example, Sheaffer (1977) and Sheaffer and Roland, Inc. (1980).

7. Floods greater than the 100-year flood caused 61% of the losses experienced in the United States between 1959 and 1974 (Sheaffer *et al.* (1976, p. 49).

8. For example, when flooding exceeded levees designed to withstand a 100-year flood in Jackson, Mississippi, in 1978, damage to backlying structures approached 1/2 billion dollars.

9. See footnote 47, Chapter I.

10. See discussion at footnote 55, Chapter I.

11. 24 C.F.R. § 1910.3 (1976).

12. *Id.* § 1910.3(d).

13. *Id.*

14. The National Science Foundation (1980), concluded that "[b]uilding in floodways is continuing and increasing the property and lives at risk." The report recommended that

> [f]ederal, state, and local program standards should be changed to prohibit any new development in floodway areas which will increase flood elevations. There may be circumstances requiring exceptions to this prohibition. In such circumstances, a promising solution is for the developer to purchase all necessary property rights from all adversely affected property owners for increased flood damage, increased building costs, increased flood insurance and other costs (p. 215).

15. 41 Fed. Reg. 46,964 (1976).

16. Fla. Stat. Ann. § 161.052 (West Supp. 1982).

17. Fla. Stat. Ann. § 161.053 (West Supp. 1982).

18. Hawaii Rev. Stat. §§ 205-32 to 205-37 (1976 and Supp. 1980).

19. See R.I. Gen. Laws §§ 46-23-1 to 46-23-16 (1980), §§ 2-1-13 to 2-1-17 (1976), and 11-461-1 (Supp. 1980).

20. Wash. Rev. Code Ann. §§ 90.58.010 to 90.58.930 (Supp. 1981).

21. Mich. Comp. Laws Ann. § 281.631 (1979).

22. 24 C.F.R. § 1910.3 (1976).

23. Me. Rev. Stat. Ann. tit. 12 §§ 4701 to 4758 (1981).

24. R.I. Gen. Laws §§ 46-23-1 to 46-23-16 (1980); N.C. Gen. Stat. §§ 113A-100 to 113A-134 (1978).

25. Office of the Chief of Engineers, U.S. Army (1973).

26. See bibliography to Chapter II.

27. See Sheaffer and Roland, Inc., (1979).

28. See footnote 55, Chapter I.

29. Examples include Hilo, Hawaii; Prairie du Chien, Wisconsin; and Soldiers Grove, Wisconsin.

30. For discussion of floodplain acquisition see Ralph M. Field Associates (1981), and references in Chapter III.

31. E.g., Rhode Island, Executive Order No. 35, October 23, 1978; Wisconsin, Executive Order No. 67, November 26, 1973; California, Executive Order B-39-77, November 26, 1977.

32. Commonwealth of Massachusetts, Executive Order No. 181, Barrier Beaches, August 13, 1980.

33. N.J. Stat. Ann. § 58:16A-61 (1982) provides:

> Local assessors shall consider the impact of rules or regulations issued pursuant to this act in establishing full value of lands designated as floodways or as flood fringe areas.

34. Mass. Gen. Laws. Ann. ch. 59, § 11 (West Supp. 1981); ch. 184, §§ 31-33 (West Supp. 1981). See also N. Y. Envir. Conserv. Law § 25-0302-2 (McKinney Supp. 1981-1982); Conn. Gen. Stat. Ann. § 22a-45 (1981).

35. Council on Environmental Quality (1976).

36. *Id.* See Cal. Gov't Code § 51201 *et seq.* (West 1966).

37. See 26 U.S.C. § 170(b)(1)(c) (Supp. 1977); 20 U.S.C. § 2055(e)(2) (Supp. 1977); 26 U.S.C. § 2522(a)(2) (Supp. 1977).

38. See the many educational materials listed in the bibliography of Appendix A, Strengthening State Floodplain Management.