Compounding and discounting

They put today's & future $$ on the same basis

Which would you rather have: $100 today? Or $100 five years from now? Most people would say "today." They could spend the money now for something they want, and not have to wait. Or they could save the money now, earn interest, and have considerably more than $100 five years from now. That's the idea behind compounding and discounting, which are two ways to help compare proposals that have quite different flows of costs and returns over extended time periods.

Here's an example: You're the manager of a local land trust. The trust wants to protect rural land from intensive development, but does not oppose profitable land uses that are environmentally friendly. It is looking ahead 30 years. The trust has acquired a tract of old pasture that is growing into shrubs and trees. You're weighing two options: 1) selling ordinary firewood every 10 years, or 2) nurturing high-quality hardwoods that can be harvested at the end of 30 years. At first glance, it appears that the trust would earn 50 % more (to use for protecting other tracts) by producing hardwoods:

Cash returns at the end of 30 years, if:	From the 10th year harvest	From the 20th year harvest	From the 30th year harvest	Total $$ over the 30 years
Ordinary wood products	$20,000	$20,000	$20,000	$60,000
High-quality hardwoods	0	0	$90,000	$90,000

But the trust would have to wait 30 years. With ordinary wood products, it could be earning additional funds after only 10 and 20 years by investing the returns in a money market fund or something like that. If the compound interest from these earnings is taken into account (let's assume 6% per year), the comparison at the end of 30 years is quite different. Ordinary wood products would have considerably higher payoff:

Returns plus 6% interest at the end of 30 years, if:	From the 10th year harvest(a)	From the 20th year harvest(b)	From the 30th year harvest(c)	Total $$ over the 30 years
Ordinary wood products	$64,200	$35,800	$20,000	$120,000
High-quality hardwoods	0	0	$90,000	$90,000

(a) Each $ invested @ 6% for the remaining 20 years would be worth $3.21.
(b) Each $ invested @ 6% for the remaining 10 years would be worth $1.79.
(c) There would be no time for the 30-year harvest to be invested to earn interest.
These "compounding factors" are in tables in some finance books and computer programs.

This example has compared ordinary wood and hardwoods at the ***end*** of the 30-year period by using ***compounding***. One could make the same comparison, and would reach the same conclusion, by viewing returns from ***Year 0*** and ***discounting*** back to the present. I.e., how much money would you have to invest now to be equal to the tract's potential? In fact, discounting is the more usual way to make such comparisons. Of course, the land trust may wish to consider other goals besides financial return (e.g., scenic beauty) and still go for the hardwoods. But compounding/discounting helps to see what the trade-offs are.

For more, see the Benefit-Cost item on this web site.