EAD Example Calculation

The following is an example calculation of Expected Annual Damage (EAD) for a single island with assets totaling $3 billion. For simplicity, it considers only one of the many hazards -- high water levels in the Delta – thought the method is applicable to any number of other hazards. It also aggregates all assets into a single total asset value and uses a single depth-damage curve, though this too can be applied to any number of different asset classes, each with their own depth-damage curves.

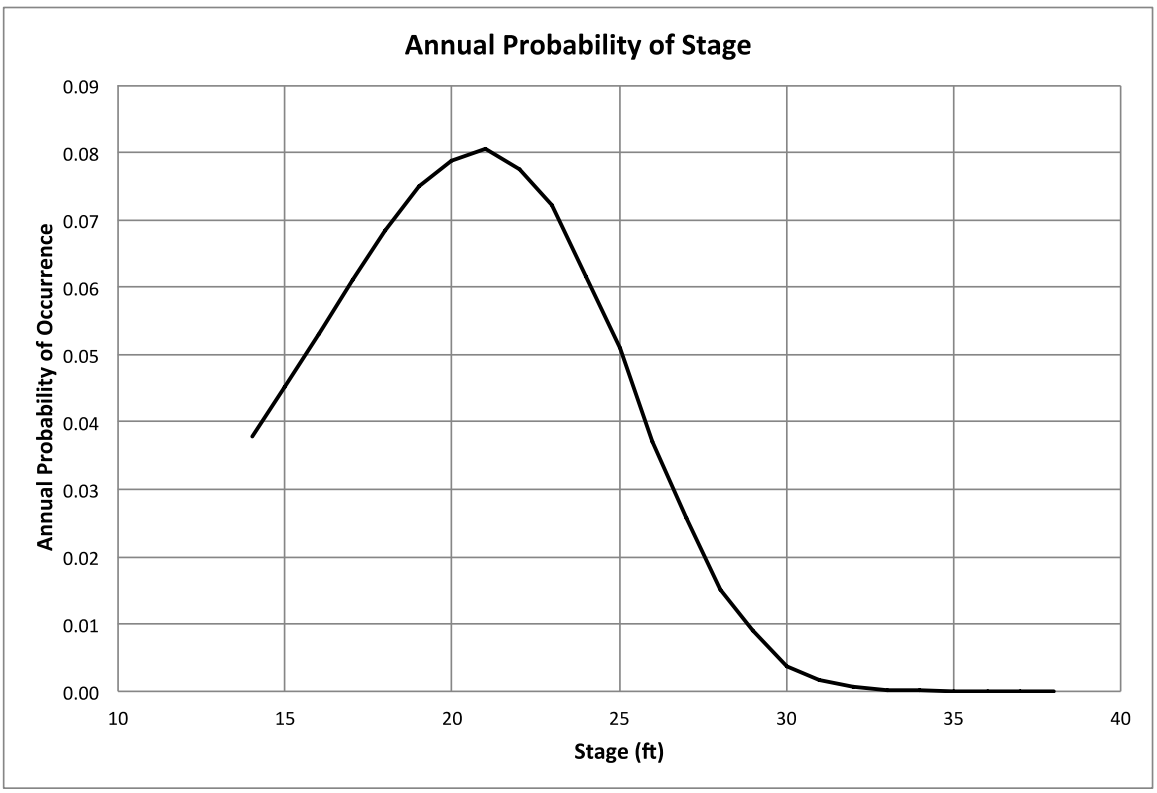
It uses three curves shown in the graphs below:

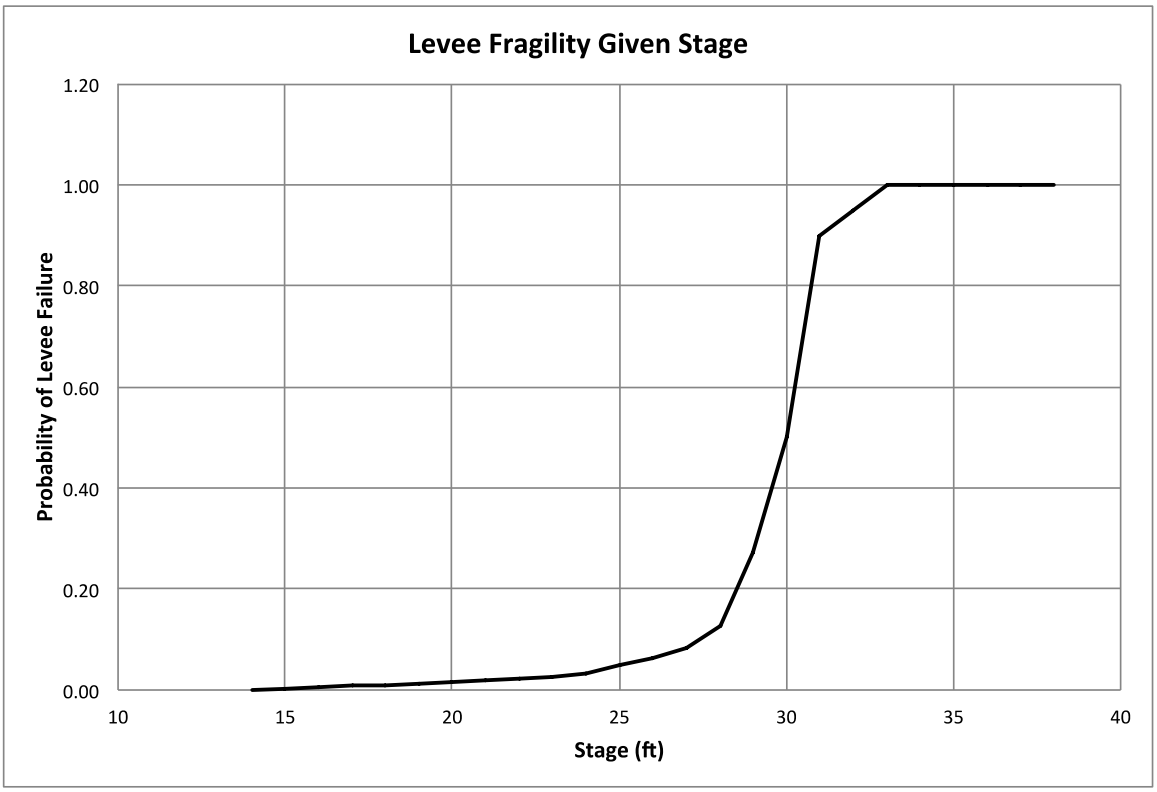
1. p_s: The annual probability of a particular stage occurring
2. f_s: The likelihood of a levee failure given each stage
3. d_s: The percent of the island's asset value that would be lost at each stage

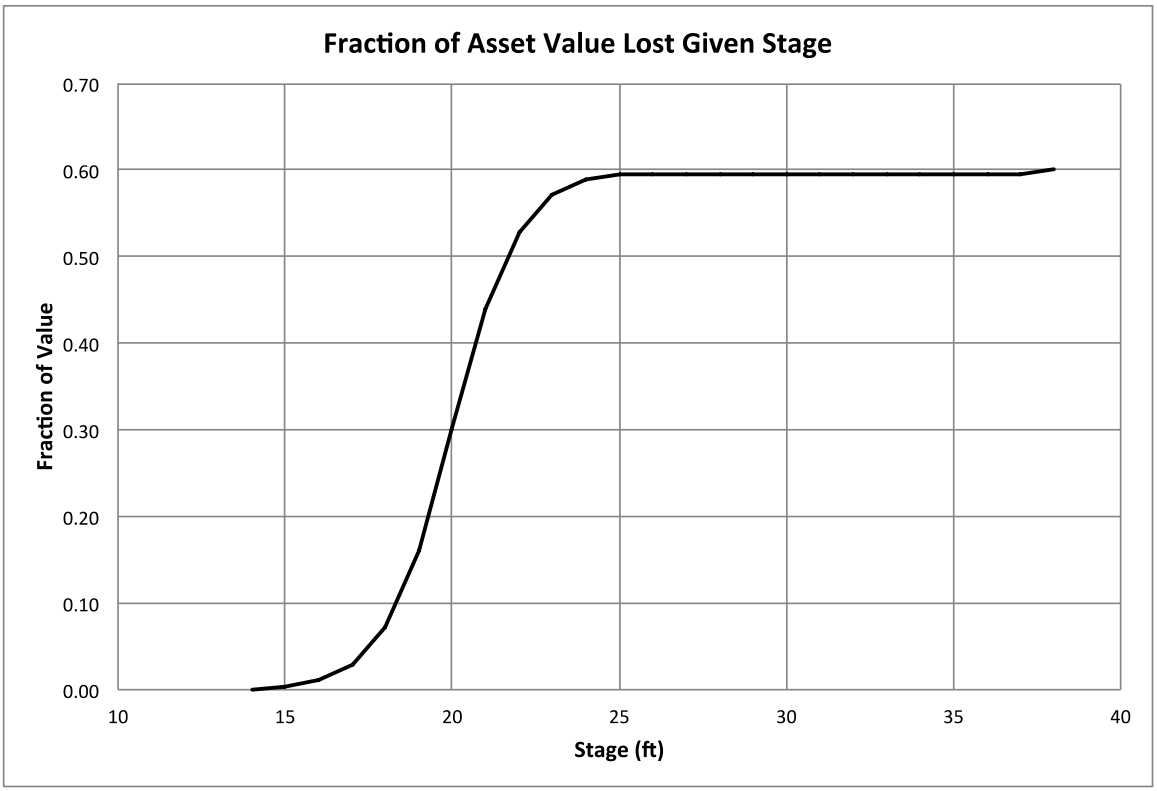
Calculating EAD is straightforward given this information:

$$EAD = \Sigma_s (3x10^9)(p_s)(f_s)(d_s) = \$42 \text{ million}$$

The numerical calculations are shown at the end of this document.




Levee Fragility Given Stage
Probability of Levee Failure
1.20
1.00
0.80
0.60
0.40
0.20
0.00
10
15
20
25
30
35
40
Stage (ft)


Fraction of Asset Value Lost Given Stage
Fraction of Value
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
10
15
20
25
30
35
40
Stage (ft)

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*
Stage (ft)	*Annual Probability of Stage*	*Levee Fragility Given Stage*	*Probability of Flood Given Stage (B x C)*	*Inundation Depth Given Stage (ft)*	*Value of Assets on Island ($)*	*Fraction of Asset Value Lost Given Depth*	*Asset Value Lost (F x G)*	*Expected Asset Value Lost (D x H)*
14.0	3.79E-02	0.00E+00	0.00E+00	0	3.00E+09	0.000	0.00E+00	0.00E+00
15.0	4.51E-02	1.00E-03	4.51E-05	0.29	3.00E+09	0.002	7.42E+06	3.35E+02
16.0	5.31E-02	4.20E-03	2.23E-04	1.29	3.00E+09	0.011	3.30E+07	7.36E+03
17.0	6.12E-02	7.50E-03	4.59E-04	2.29	3.00E+09	0.028	8.40E+07	3.86E+04
18.0	6.85E-02	1.08E-02	7.40E-04	3.29	3.00E+09	0.072	2.16E+08	1.60E+05
19.0	7.49E-02	1.40E-02	1.05E-03	4.29	3.00E+09	0.161	4.83E+08	5.06E+05
20.0	7.88E-02	1.73E-02	1.36E-03	5.29	3.00E+09	0.300	9.00E+08	1.23E+06
21.0	8.06E-02	2.06E-02	1.66E-03	6.29	3.00E+09	0.439	1.32E+09	2.19E+06
22.0	7.74E-02	2.38E-02	1.84E-03	7.29	3.00E+09	0.528	1.58E+09	2.92E+06
23.0	7.23E-02	2.71E-02	1.96E-03	8.29	3.00E+09	0.572	1.72E+09	3.36E+06
24.0	6.17E-02	3.19E-02	1.97E-03	9.29	3.00E+09	0.589	1.77E+09	3.48E+06
25.0	5.09E-02	4.83E-02	2.46E-03	10.29	3.00E+09	0.596	1.79E+09	4.40E+06
26.0	3.72E-02	6.46E-02	2.40E-03	11.29	3.00E+09	0.596	1.79E+09	4.30E+06
27.0	2.58E-02	8.27E-02	2.13E-03	12.29	3.00E+09	0.596	1.79E+09	3.81E+06
28	0.015	0.1285	1.93E-03	13.29	3.00E+09	0.596	1.79E+09	3.45E+06
29	0.0091	0.2711	2.47E-03	14.29	3.00E+09	0.596	1.79E+09	4.41E+06
30	0.0037	0.5	1.85E-03	15.29	3.00E+09	0.596	1.79E+09	3.31E+06
31	0.0018	0.9	1.62E-03	16.29	3.00E+09	0.596	1.79E+09	2.90E+06
32	0.0007	0.95	6.65E-04	17.29	3.00E+09	0.596	1.79E+09	1.19E+06
33	0.0001	1	1.00E-04	18.29	3.00E+09	0.596	1.79E+09	1.79E+05
34	0.0001	1	1.00E-04	19.29	3.00E+09	0.596	1.79E+09	1.79E+05
35	0	1	0.00E+00	20.29	3.00E+09	0.596	1.79E+09	0.00E+00
38	0	1	0.00E+00	23.29	3.00E+09	0.600	1.80E+09	0.00E+00
							EAD:	**4.20E+07**